A STUDY OF THE ADOPTION OF INNOVATIONS BY SYRIAN FARMERS

by

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Thesis submitted to the University of Nottingham for the degree of Doctor of Philosophy

June, 1990

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ACKNOWLEDGEMENTS

I would like to express my thanks to my supervisor Dr M.F. Seabrook for his immense help, encouragement and support during my research work and the preparation of this thesis.

I thank the University of Aleppo for all their financial support during my stay in the U.K., and its staff.

I am in great debt to ICARDA Organization and its staff particularly Dr T. Nordblom who have given me more kind support during the data collection. Dr Nordblom's great help, cooperativeness, and advice will never be forgetten. Many thanks are extended to Mr S. Baradie, Mr J. Abdullah, Dr A. Wehbi, Dr D. Tully, Mr A. Mazid, Mrs S. Morali, Miss A. Rassam and all other FSP staff for their help and encouragement.

My great thanks are also given to the farmers for their cooperation, hospitality, cheerfulness and patience in accommodating me.

I will also like to extend to the staff of the Ministry of Agriculture my appreciation particularly for those who were involved in extension and research work in the studied areas.

To the staff of the Department of Agriculture and Horticulture, I extend my profound gratitude. Also my thanks are given to Dawn Petherick, Mr J. Craigon and Dr K. Gregson for their kind computing advice.

My friends and other postgraduate colleagues have been an inestimable value and great encouragement to me throughout my stay.

In conclusion this thesis is dedicated to my family, my father, mother and brothers particularly Abo Firass for his solid encouragement and support. To my wife Salha and children Nojod, Ahmad and Yasmine for the stress and fatherly absence they went through in the process of compiling this thesis.

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Abstract

The objective of this research was to investigate, study, analyse, and report conditions under which Syrian "rainfed" wheat farmers live interact and adopt innovations and improved cropping practices. The purpose of this was to help in understanding forces that can influence farmers' decisions to adopt innovations and which influence their adoption behaviour. The research, also, has attempted to develop concepts and methods which have rarely been used before in Syrian conditions.

The study was carried out in the two largest rainfed cropping areas in the country; Aleppo province to the north and Hassakeh province to the east, the sample of farmers was distributed in First Stability Zone (Zone1) and Second Stability Zone (Zone2). A total sample of 60 farmers were randomly selected from both areas.

Nine agricultural innovations and improved cropping practices were selected and farmers' adoption behaviour with regard to these innovations and improved practices were investigated. The nine innovations and practices were; "the use of nitrogen", the use of "phosphorus", "following the recommended time of nitrogen application", "the use of improved wheat varieties", "the degree of following the seed renewal for wheat", "the use of herbicides", "the use of pesticides", "the use of sowing machines", and "following the recommended seed bed preparation".

The "Sten Score" method was adopted in order to score the adoption behaviour of farmers for the nine selected innovations and improved cropping practice. The method was modified in order to achieve the best classification of farmers on the basis of their adoption behaviour.

Four major aspects and characteristics were selected, investigated and later were analysed in relation to the adoption behaviour of farmers with regard to the nine selected innovations and improved practices. These aspects and characteristics were Personal and Socio-Economic, Economic and Institutional, Communicational, and Psychological Factors. The study has concentrated on characteristics which usually have been ignored or avoided in past adoption and diffusion research. Special methods have been devised in order to help in measuring these aspects and characteristics.

Special attention was paid to the role of personality and the Self-image of farmers as important aspects affecting their adoption behaviour. Until recently research into farmers' decision making to adopt or reject innovations did not pay attention to the role played by these factors at the time of taking the decision to adopt innovations.

The major findings in Zone1 revealed that the adoption of innovations and improved practice by farmers were related highly and significantly with farmers' "Self-image", the "availability of credit and cash money" and "having an Extension plot or field demonstration on the farm". The three variables together explain over 70% of the variation in the adoption behaviour

of farmers. In Zone2, the farmers' "Self-image", and the "availability of machinery and equipment on the farm" were found to be the best related variables with the adoption behaviour of farmers. The two variables together explain over 60% of the variation in the adoption behaviour of farmers.

The recommendations for the policy makers and the Extension organisations in Syria were based on the major findings as well as other findings which were revealed throughout the research.

CHAPTER 1

Introduction

In Syria, the wheat crop occupies the second largest cropping area after barley, but it occupies the first place in overall output because it is grown in the more productive areas, (SA 1983). Wheat plays an important and crucial role in the people's daily diet, it is ranked as the most crucial source for both calories and protein (FAO 1980, 1984).

In the 1960s, the country was self-sufficient in major food commodities and was a net exporter of wheat (ISNAR 1989). In 1972 Syria exported 200,000 tonnes of wheat (USDA 1975). During the period 1974-1979 the average yearly amount of imported wheat and flour rose to about 289,544 tonnes, worth U.S $45,555,000. The average yearly imports during the 1980s increased substantially to 728,416 metric tonnes worth U.S $124,082,124 (FAO 1976, 1979, 1982, and 1985).

The deficit in wheat was attributed amongst other reasons to the fluctuation in rainfall, the high growth rate of the population (the population rose from 4.565 million in 1960 to 11.626 million in 1987) and the lack and slowness of adoption of new technologies. Therefore, in order to boost the productivity of agriculture, particularly wheat, the Government since the 1970s has tried to expand the irrigated and cultivated area, it has become involved directly in agricultural planning, it has also encouraged research and the transfer of technology, and has carried out more agrarian reform. However, aside from the Government's involvement in planning and agrarian reform, the expansion of uncultivated and irrigated areas is recognised as not being the ultimate solution for increasing productivity. As Manners and Sagfi-Nejad (1985) said "The experience of the past quarter century suggests that the limit of viable rain fed cultivation has been exceeded and the expansion of Syria's irrigated area is likely to be slower and more than

originally envisaged. In these circumstances, increases in agricultural output will be dependent upon raising productivity through improved cropping practices".

Fortunately, since the 1970s the development of improved cropping practices has made progress in National and International Institutes in Syria. Some results have started to emerge, for example, the International Center for Agricultural Research in Dry Areas (ICARDA) has reported encouraging results that show a significant response of plants to fertilization with nitrogen and phosphate, to weed control and to earlier planting dates. These responses would be better if all the three improved practices were used together as an integrated package (ICARDA 1984a and FSP 1984). This means that these improved practices, in order to achieve the best responses, should be released to farmers as a complete package rather than as single practices. However, this will mean that the adoption of the whole package by farmers is difficult and the diffusion of the complete package by the specialized Extension organisation even harder.

However, since the research has pointed at improved cropping practices as a possible panacea for recovering the agricultural economy, in particular rain-fed wheat farming, attempts must be made to diffuse the improved practices among farmers. This would not be possible unless the conditions under which farmers live, interact and adopt are well investigated and made known to the responsible Extension organizations. The Agricultural Extension Organization is responsible in Syria for attempting to diffuse innovations to farmers.

In fact the attitudes and behaviour of farmers in much of Syria have not been the subject of any systematic research. There is little up to date information on the factors influencing the adoption of innovations by Syrian farmers. Even less is known about their motivations, personal feelings and needs. One of the main reasons for this lack of research is a lack of resources and skills for investigative research. The objective of this thesis is to generate detailed knowledge on factors influencing adoption of new technologies by a group of Syrian farmers. This research is designed to study, analyse and report the conditions under which rain-fed wheat farmers live, interact

and adopt innovations and improved practices in a hope that this could be used for improving the adoption behaviour of other farmers. It might also predict the best way for fostering the adoption of improved practices which are under development in National and International Research Institutes in the country. It is also hoped that the research will generate a detailed understanding of the way farmers view their lives, families and farming. Although it is recognised that obtaining such intimate details is far from easy, it is however considered necessary to attempt such an investigation.

The study has been carried out in the northern and eastern part of the country where, particularly in the eastern part, there is very limited or no research information on farming systems or how farmers take the decision to adopt. Manzardo (1980) said in this matter "Aside from the studies of Sweet (1960) and Horton (1961) ... now themselves quite dated ... and the shorter analyses of Hinnebush (1976) and Gattinara (1973), there have been no systematic and wide-ranging studies of agricultural communities in this country (Syria) since the time of the French". Also he adds ".... we have little information about how farmers make decisions or even about their basic farming systems".

The specific objectives of this study are:

- To select those improved rain-fed wheat production practices that have been identified as being crucial to improved production, and to identify the adoption behaviour of farmers with regard to the selected practices.
- To study, assess and analyse the factors that influence farmers' adoption behaviour. These can be summarized as; Personal and Socio-economic factors; Economic and Institutional factors; Communicational factors; and Psychological factors. It is intended to place emphasis on attempting to collect information on Psychological factors which have not been researched in detail in Syria.
- To attempt to identify the factors that should be considered by the Extension organisation in increasing future adoption behaviour of farmers.

Chapter 2 provides relevant background information on Syria and Chap-

ter 3 outlines previous research that is relevant to this thesis. Chapter 4 details the research methodology, stressing the particular problems of research on Syrian farmers. Chapter 5 uses the data collected to classify the farmers by level of adoption. This classification is then used in analysis of factors influencing that level of adoption. These factors include Personal and Socio-economic factors and specific Psychological measures. These are fully discussed in Chapter 6 to Chapter 9. Chapter 10 examines the research results and identifies the crucial factors related to adoption. This chapter highlights a number of Psychological variables and also indicates positive action roles for the Extension organisations.

CHAPTER 2

Syria-The Background

2.1 Geographical and climatic characteristics

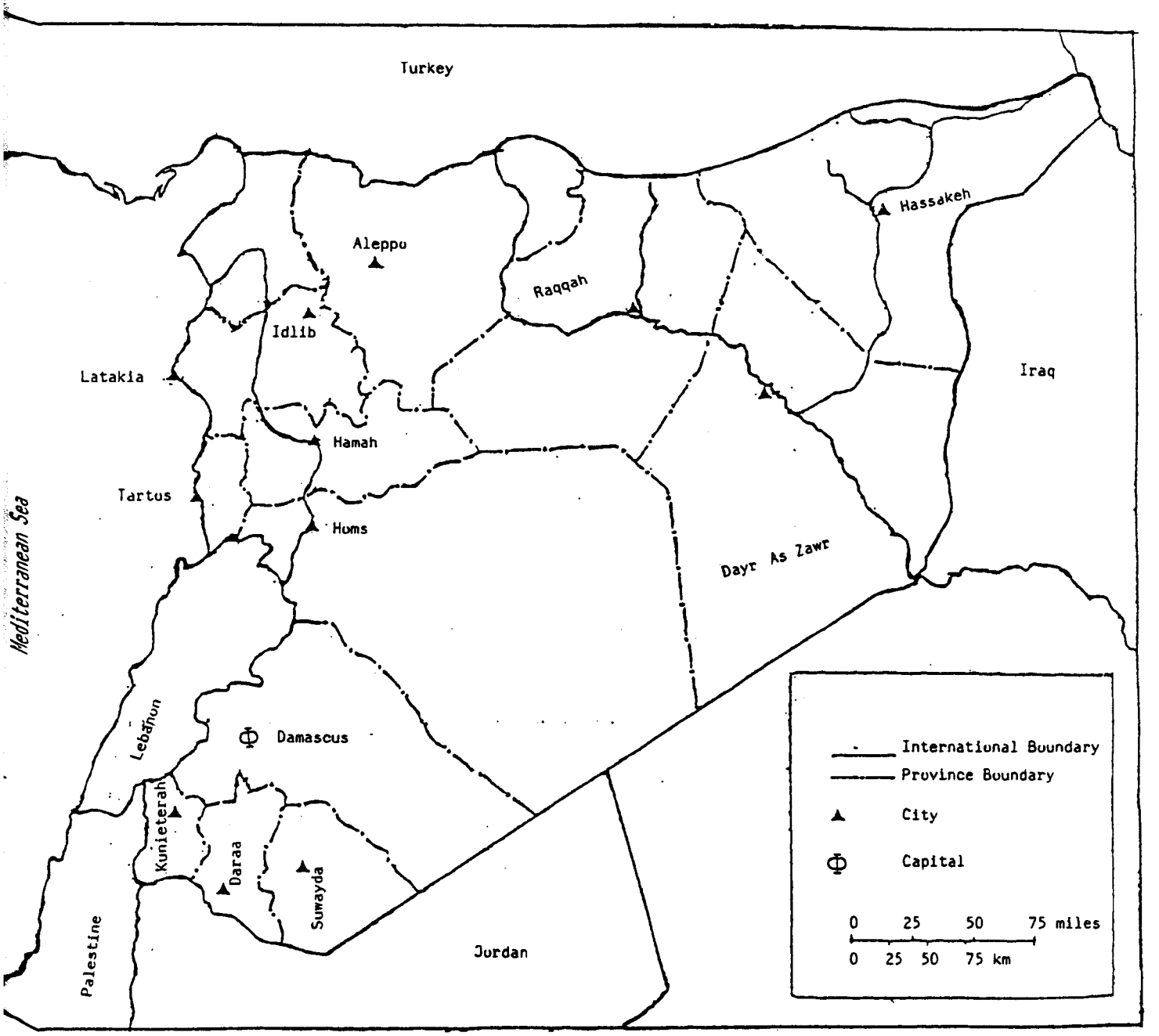
The Syrian Arab Republic is situated in west Asia on the eastern coast of the Mediterranean Sea, with a total area of 185,180 km^2, of which 99.4% is land area (FAO 1988). It is bordered by Turkey to the north, Iraq to the east, Palestine, Jordan and Iraq to the south, and Lebanon and the Mediterranean Sea to the west. (see Map 2.1)

The latest cropping data available were for 1986. These data reveal that 30.8% of the total land area was under cultivation (permanent crops occupy 3.4% while other crops occupy 27.4%), 21.3% was other land (uncultivatable - 18.6% and potential agricultural land - 2.7%), 45.1% is steppes and open grazing land and 2.8% is forest (FAO, 1987).

Geographically, Syria can be divided into four regions; the coastal plain which is the area between the mountains and the sea coast (40,000 hectares of fertile soil); mountains and hills which are parallel to the Mediterranean coast from the south to the north (8% of the total area); the inland plains (37% of the total area); and the semi-desert region which occupys the eastern and southern part of the country along with the border with Jordan and Iraq (ISNAR, 1989).

The country is administratively divided into several provinces or Muhafazat (Muhafaza is the singular). Each province is divided into districts or Manatik (Mantika is the singular). Each district is divided into several sub-districts or Nawahi (Nahia is the singular). Each sub-district consists of several villages or Kura (Karieh is the singular), which are the smallest administrative units in the country. There are 14 provinces, 60 districts, 183 sub-districts, and 6516 villages (SA, 1987). (See Map 2.1).

Syria is characterized by a Mediterranean type climate, i.e. cool and



Map 2.1

The country map showing administrative, divisional and international boundaries

rainy during the Winter and hot and dry during the Summer, with short Autumn and Spring seasons. The amount of rainfall decreases from 800 - 1000 mm in the west at the coastal and mountain regions, to less than 200 mm in the steppes regions. The coldest months in the year are December and January where temperatures drop to about -5 C° while the hottest months are July and August where the temperature rises to more than 40 C° (ISNAR 1989).

Syria can be divided into five agricultural stability zones in relation to the annual rainfall and rain-fed cropping patterns.

1. First Stability Zone with an annual rainfall over 350 mm. This zone can be divided into two sub zones:

   - First Stability Zone A: with an annual rainfall of over 600 mm.
   - First Stability Zone B with an annual rainfall of between 350 - 600 mm and not less than 300 mm during 6 years out of ten. The main crops are wheat, legumes and summer crops.

2. Second Stability Zone: This receives an annual rainfall of 250 - 350 mm and not less than 250 mm during 6 years out of ten. The crops grown are barley, wheat, legumes and summer crops.

3. Third Stability Zone: with an annual rainfall over 250 mm and not less than this during five years out of ten. The main crop is barley, also legumes can be planted.

4. Fourth Stability Zone: it receives between 200-250 mm as an annual rainfall and not less than 200 mm during five years out of ten. Barley can be planted but this zone is usually considered to be a permanent grazing area.

5. Fifth Stability Zone: with annual rainfall of less than 200 mm. It is suitable for grazing and irrigated crops only (AASA 1984).

2.2 The population

The total population of Syria in 1987 was 11.626 million of which 51.9% were in rural areas. The number is expected to be about 19 million by the

year 2000 (FAO 1988). In comparison the total population number in 1960 was about 4.5 million while this number in 1970 jumped up to about 6.3 million. (Akhras 1980).

The majority of people are Arab with a small Kurdish, Armenian, Gzerkesian and Jewish minority. Arabic is the dominant and official language with English as a second language. Most of the population (85%) are Moslems while the rest are nearly all Christian with a small Jewish minority. (El-Qadi 1978).

The Arab Ba'ath socialist party whose Secretary General is the President is the ruling party in the country is based on socialist principles that are adapted to the Syrian conditions.

2.3 Agriculture

2.3.1 General

According to ISNAR (1989), only 11.6% of the cultivated land in 1986 was irrigated. The rest is rain-fed land (57.8%) and fallow (30.6%). About 77% of the rain-fed area is planted with wheat and barley. In comparison, about two thirds of the irrigated area is planted with wheat and industrial crops such as sugar beet and cotton.

The major rain-fed crops are wheat, barley, legumes, tobacco, watermelon, olives and fruit. While the principle crops of the irrigated area are wheat, sugar beet, cotton, vegetables and fruits.

Concerning livestock, Syria has 723,000 cattle plus 1,000 buffalo, 5,000 camels, 13,304,000 sheep, 1,078,000 goats, 1,000 pigs, 12,000,000 chicken, 43,000 horses, 30,000 mules and 200,000 asses (FAO 1988).

With respect to farming pattern, three types of farms exist under the Syrian condition namely; state, cooperative and private farms. The state farms are owned and managed by the Government and production is by agricultural workers. These farms only constitute 2% of the cultivated land. The cooperative farms consist of small scale farmers, who are the beneficiaries of the agrarian reform as well as those who own relatively small areas of land. They constitute 32% of the cultivated land. The members of the cooperative share in machinery use (rarely available) purchasing inputs, and marketing goods. Lastly, the private farms constitute 66% of the culti-

vated land. They are owned and operated separately by individuals. They can be both small and relatively large scale farms. However, according to AOAD (1984), 56.4% of the Syrian farms are from 0-5 ha, 17.4% from 5-10 ha, 23.5% from 10-50 ha, 1.8% from 50-100 ha and only 0.9% are above 100 ha.

However, within the complicated land tenure, there is a tendency for a reduction in the farm size both across cooperative farms and private farms. The majority of the farms are small (8.5ha) and divided into several non continuous plots (<1 ha). Therefore, the combination of this pattern of land holding, as well as fragmentation, is one of the constraints for technological change in the country (ISNAR 1989).

Agriculture plays an important role in the life of the Syrian people and the country's economy. It provides food, fibre, and capital. The total contribution of agriculture to the national economy of the country is counted to be 21% compared to 23% from trade, 20% from manufacturing and mining and 36% from others such as building and construction, communication, transport, insurance, social and Government services (SA 1983). In addition, agriculture is considered to be an important source of employment. It employs 31.7% of the total employees in the country.

2.3.2 New technology and the Government

Since 1976, the development and diffusion of new technologies have been the top priority for the Government through the five-year plans in order to increase the self-sufficiency in basic food and feed stuffs. The diffusion of new technology among Syrian farmers for the last two to three decades has not generally been considered as an independent decision by individual farmers, rather as the function of planning and distribution of fertilizers, seeds, pesticides and loans through the Agricultural Cooperative Bank (ACB). Therefore, the decision taken by an individual farmer has more often been concerned with whether to reject ideas rather than of one to adopt. In other words it is not possible for many farmers to adopt outside the range of alternatives offered by the Government. The farmer can however readily refuse to adopt new things offered.

2.3.3 Credit

Agricultural Cooperative Bank (ACB) is the major source for financing agriculture in Syria. It is owned and managed by the Government. It has 62 branches distributed throughout the country (SA 1983).

The ACB provides farmers with low cost subsidized credit in both cash and kind. Every Syrian farmer has the right to obtain credit from the ACB. This involves the acquisition of a licence from the Ministry of Agriculture and Agrarian Reform (MAAR) and a requisition for supplies. This does not mean that every farmer has to travel to Damascus to obtain the licence the agricultural engineers (a person who has spent 4 or 5 years studying general agricultural subjects at any Faculty of Agriculture in Syria is called an agricultural engineer or Muhandis Zeraiey) who work for the MAAR in other regions throughout the country can give a licence to farmers. In most regions, the farmer or the cooperative (a group of farmers), in conjunction with planning agents, decide on how much land will be devoted to each crop. Then the agricultural engineer goes to a set of standard tables prepared by the Directorate of Soils and determines the inputs required for each crop and enters it onto the requisition. The recommended inputs for each crop are then taken to be checked by the Mantika office and approved. However, very seldom are the standard recommendations, whether in type or amount, modified to fit the local conditions (Manzardo 1980). Therefore it would not be surprising if farmers did not in fact follow these recommendations.

The ACB allocates credit among state, cooperative, and private sectors. According to Al-Ashram (1985) the cooperative sector received more than half of ACB's loan in 1982 while the private sector in 1970 was receiving about three quarters of the ACB's loans. There was no change for the share of the public sector since 1970 which was about 3% of the ACB's loans.

Although the ACB is the primary source for farmers' credit, farmers might utilize other sources for credit such as Commercial Banks, Industrial Banks, Tobacco Monopoly and international institutes working in the country.

Three types of loans can be obtained from the ACB; short (less than a year), medium (5 years) and long term (10 years). The interest rates, in

1989, for short and medium term loans were 4.5% and 5.5% for cooperative and private farmers respectively, while the long term loan was free of interest rate. The amount of money which can be obtained from the ACB varies considerably and this would depend on the type of crops, type of loan and the farmers' property. Most of short term loans, however, have been given to farmers as loans in kind (MAAR, 1989).

2.4 The Source of New Technical Information For Syrian Farmers

Farmers in Syria obtain new and technical information about innovations or improved cropping practice from different sources. The prime source is the Ministry of Agriculture and Agrarian Reform. The other sources include, the General Peasant Union (GPU), the Ministry of Euphrate Dam, through its division of the General Administration for the Development of the the Euphrates Basin, the Agricultural Cooperative Bank (ACB), the General Organisation for Tobacco and the international agencies like the Food and Agricultural Organisation of the United Nations (FAO), the International Center for Agricultural Research in the Dry Areas (ICARDA) and the Arab Centre for the Studies of Arid Zones and Dry Lands (ACSAD).

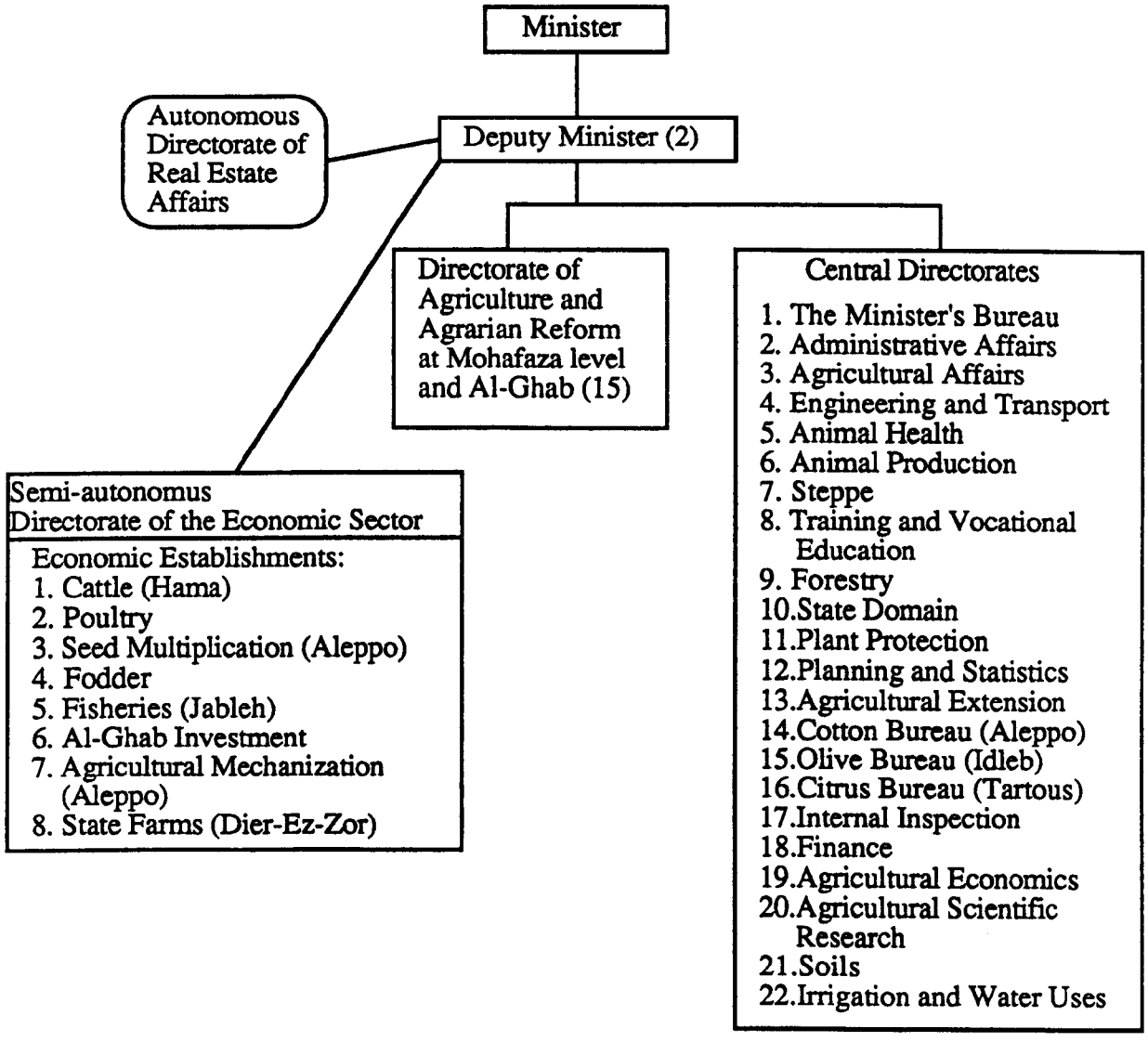
2.4.1 The Ministry of Agriculture and Agrarian Reform (MAAR)

MAAR in the country consists of several directorates dealing with different agricultural activities. These directorates are represented in each Mohafaza throughout the country under the Directorates of Agriculture and Agrarian Reform who represent the MAAR at the Mohafazat levels. (See Fig. 2.1)

Among these directorates is the Directorate of Agricultural Extension (DAEX) who has the prime responsibility for transferring new information to Syrian farmers. As has been mentioned, each directorate has its representative at the Mohafaza level. The representative of DAEX at the Mohafaza level is called the Department of Extension (DEX). The DEX in turn has its representative at the Mantika level and the Mantika level has representative at village level. (See Fig. 2.2). The flow of information from either the top or the bottom is decentralized, but the communication between different levels nearly always takes place between executives rather than involving

Ministry of Agriculture and Agrarian Reform (MAAR)

ORGANIZATIONAL STRUCTURE

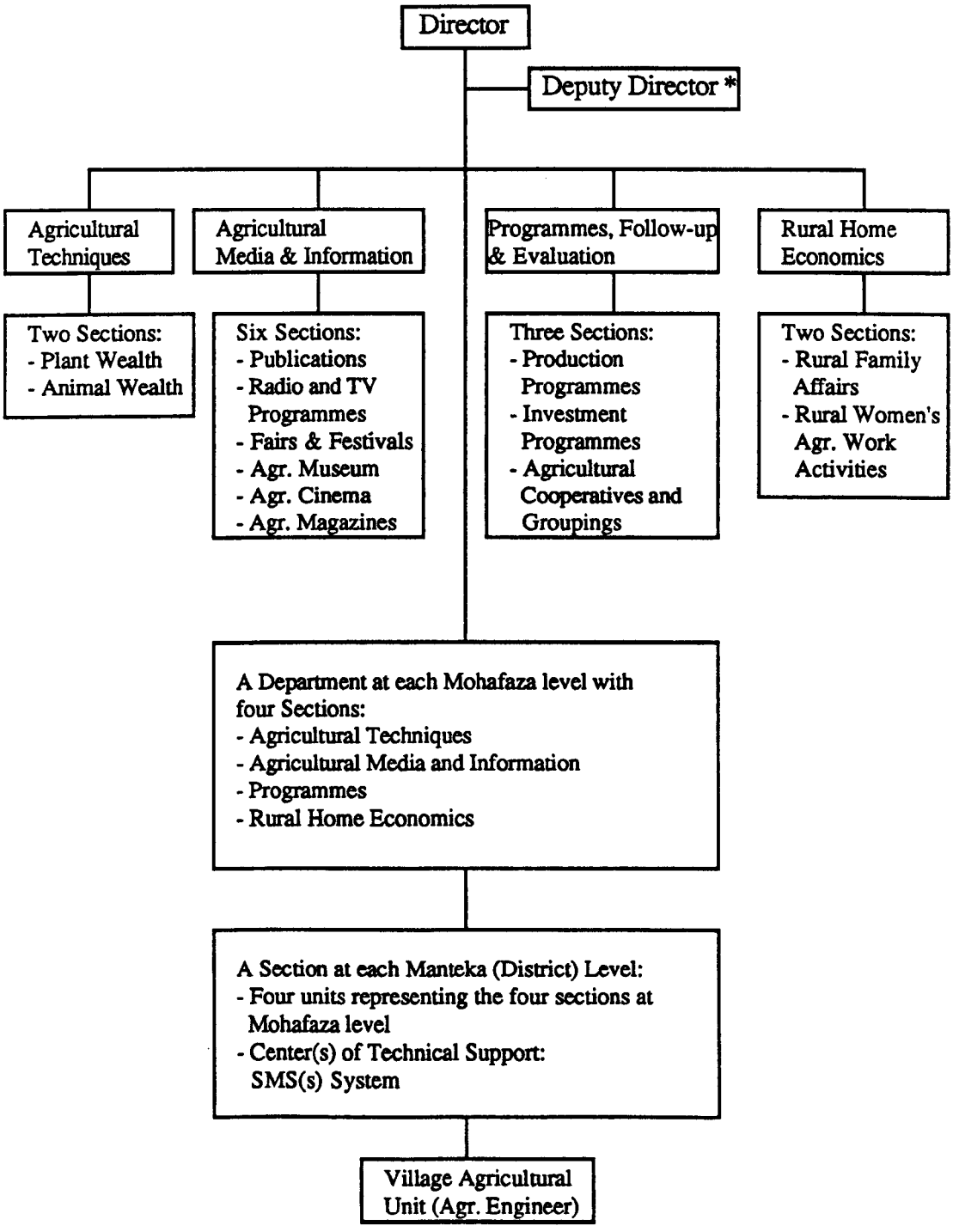


Source: ISNAR, 1989.

Fig. 2.1

Directorate of Agricultural Extension

ORGANIZATIONAL STRUCTURE



* Deputy Director is one of the heads of central departments.

Fig. 2.2

all staff in that organisation. Thus the communication does not take into account the real farming situation and attitudes of farmers. (Personal Communication). This might lead to distortion in the mechanism of exchanging the relevant information to farmers.

Extension activities are carried out through face to face communication as well as by mass media. Face to face communication takes place on several occasions such as normal exchange visits between farmers and Extension worker, training courses, field days, field demonstrations, meetings, film shows etc. The mass communication is accomplished through printed material such as Extension leaflets as well as through radio and television programmes.

Training courses are organised by the Peasant Union who mainly deal with the beneficiaries of Agrarian Reform as well as with small farmers and cooperative activities in the country. According to Manzardo (1980) there are two types of training courses one which last for about a week, and long courses which last from 90 - 145 days. Different ages of farmers with different backgrounds attend the courses together and learn different activities.

Extension plots or field demonstrations are the responsibility of Extension workers in the regions. They demonstrate new techniques or methods in small plots of land, for example, 0.5 ha in the case of wheat. They are placed on farmers' land, farmers usually provide land, labour, and water for the plot while the MAAR through the ACB provides free inputs needed for the plot. If, however, the plot fails then no compensation for farmers is given. (MAAR 1987)

Extension publications are the responsibility of the Department of Agricultural Media and Information. These publications deal with different subjects and activities. Regardless of some of the technical disadvantages of these publications, they have no ready access to farmers (unless farmers obtain them by themselves) because the problem of distributing them has not been resolved. The postal system for example is not efficient, and the names of the farmers are not known.

2.4.1.1 Other organisations related to the MAAR

Farmers can also obtain information from different organisations and projects related with the MAAR. These are: Special MAAR projects such as the Fruit Tree project and the Rural Development project; the General Marketing Organisation such as the organisation for cattle, seed, poultry, fisheries, machinery, feed and also the cotton bureau; the Ghab project (67,500 ha of irrigable land located 35 km. west of Hama city); and the State farms. (Manzrdo 1980).

2.4.2 Other source for agricultural information

The General Peasant Union (GPU) is one of these sources. Although it is independent from the MAAR, it has a very close working relationships with it. It is situated in the Capital and has , like the MAAR , representatives or branches in every province, in every district as well as in the village, where the village cooperative is the smallest unit of the administrative structure of the GPU. The GPU tries to help those farmers to get cheap inputs and credit through the ACB and to get better accessibility to technical information through appointing agricultural engineers in the village cooperative. It also trains farmers in different agricultural activities, publishes some news papers and participates in, and produces, Extension programmes through radio and television.

The Ministry of Euphrate Dam through its division GADEB and the General Organisation for Tobacco, each has its own Extension programmes and different activities for farmers in their areas.

The international agencies like FAO, ICARDA, and ACSAD are very important sources for agricultural information to farmers. However, FAO is mainly concerned with planning and advice to the Government while ICARDA and ACSAD deal with research in semi-arid and arid or dry areas. Although these organizations have no direct involvement with farmers their methods for approaching farmers, particularly those used by ICARDA, show better contact with farmers for their programmes than the national ones.

This Chapter has provided a brief background to aid general understanding. However, Chapter 4 gives far more detail on the background of the study area as well as providing an explanation of how the sample villages

been approached by the researcher.

Chapter 3 reviews key background research on adoption of innovation by farmers.

CHAPTER 3

Review of Research on Adoption of Innovations by Farmers

3.1 Introduction

The decision by the rain-fed farmers to adopt innovations is like any type of decision to be taken when accepting or rejecting new things. But it has to be admitted that additional considerations concerning the uncertainty of weather might be taken into account by an individual decision maker. Therefore, the decision to adopt in rain-fed farming would be even harder and it might take more time than usual to reach the conclusion, i.e. to adopt or reject. This has been confirmed by Purvis (1973), Aresvik (1975), Demir (1976) and Perrin (1976) who showed that the adoption of high yield varieties has been slower in rain-fed farming (semi arid zones).

The uncertainty about the weather is called by Feder, Just and Zilberman (1985) as objective risk, they said in this respect that "Innovations entail, in most cases, a subjective risk (that yield is more uncertain with an unfamiliar technique) and quite often objective risks also (due to weather variations, susceptibility of pest, uncertainty regarding timely availability of crucial inputs, etc.)".

A simple definition of change is "to leave the old behaviour and follow the new one". The best example for this is the decision to adopt an innovation by farmers and stop using the old idea. This change in farmers' behaviour is influenced by numerous factors. These factors have been studied and researched widely by many researchers in order to design or develop programmes that can foster the desired change in farmers' behaviour. Unfortunately, most of this research has focused on the role of one or two of the economic, communicational, social, institutional or personal (mostly

age and education) factors influencing the adoption behaviour of farmers, rather than on the integrated approach which includes all or most of these factors. This is because the different schools of the different sciences stress different sets of variables from the view point of their subject. For example sociologists try to stress the role of social factors while economists try to emphasise the role of profitability and so on. Further, personal factors, from the psychological point of view have been less applied in the context of agriculture (Ongkili and Quilkey 1983). In particular personality and the Self-Concept of farmers, as influences on adoption have not been deeply investigated, or applied in an agricultural environment, apart from the study done by Higgins and Seabrook (1986) and Seabrook and Higgins (1988). Rogers (1983) pointed out that "personality variables associated with innovations have not yet received much research attention, in part because of difficulties of measuring dimensions in field interviews". However, this current research study will try to bring together the past experience of different research studies by different schools in a form of an integrated approach and focus on the role of individual farmer's characteristics and attitudes as important factors for adoption behaviour .

Before reviewing different literature on factors associated with the adoption of innovations it is necessary to clarify some of the theoretical background about the initiation of change in behaviour and how the change in behaviour to adopt innovation take place.

3.2 Initiation of behavioural change

Goals, needs, or wants are the catalysts for changing behaviour or taking action. The psychologists like Kretch, Crutchfield and Ballachey (1962) said: "The individual integrates or organizes all of his psychological activities in directing and sustaining action toward a goal. What he perceives, what he thinks about, what he feels, all are influenced by his wants and the goals which he strives to achieve".

Needs means a lack of something by individuals. It is defined by Rogers (1983) as "...a state of dissatisfaction or frustration that occurs when one's desires outweigh ones actualities, when 'wants' outrun 'gets' ". But sometimes people's needs are more than what they want. People want what they

actually feel they need. This kind of need has been called by Leagans (1961) as a "felt need". Individual's needs are not always "felt needs". The desirable situation might not be seen by individuals as clear as they should see it, therefore they might not feel the need for taking any action to reach that situation. This has been called by Leagans as "unfelt need". This means that "felt needs" are the only catalyst to make an individual take action to satisfy their needs when there is no other catalyst working in their environments such as the Extension Agent. Therefore, at the first place, for an innovation to be adopted quickly, it has to satisfy people's "felt needs". If it is for "unfelt needs" then people have to be motivated. The "unfelt needs" are called by Goodenough (1963) as the "wants of change agents" (Extension workers) who search for satisfaction for these wants through persuading individuals to follow certain activities.

Leagans (1964) classified needs into three groups:

1. Physical needs: like water, clothing, food, and housing .
2. Group needs: like group affection, belonging, status, etc..
3. Integrative needs: an understanding of the philosophy of life, the needs to relate ones self to something larger and beyond the self, etc.

Maslow (1967) classifies needs into five categories:

1. Physiological needs such as thirst and hunger
2. Safety needs
3. Love and belonging needs
4. Esteem needs
5. Self actualization needs, i.e the desire for self fulfillement, for becoming what one has the potential to become.

The change in behaviour from the educational psychologists point of view, like Moore (1963) occurs because of the lack of harmony or imbalance between an individual's aspirations and his environmental condition.

This produces tension, and in order to reduce this tension, change in behaviour should occur. This process of change passes through three steps, disequilibrium, (tension or need), a goal, and action to achieve the goal. But the achievement of the goal may not free an individual from tension because this often might lead to an awareness of other goals. Consequently this might lead to another behavioural change. This point, however, was emphasized by Feder and Zilberman (1985) by arguing that the equilibrium in behaviour might not be attained due to the introduction of more new or modified technology.

The cultural anthropologists like Linton (1963) view change as spontaneous caused by the diffusion process. They argue that change is inevitable as long as the contact exists and there are elements such as facts, culture, material etc. to be diffused.

Social psychologists like Lambert and Lambert (1966) were close to cultural anthropologists in their views about the change. They see the change as an interaction among individuals. They argue that interaction is dynamic while change is its product. They mean by interaction the process by which individuals influence each other by mutual interchange of feelings, reaction and thought.

Sociologists like Miles (1964) argue that change occurs by the alteration of goals, structures, or processes by the social system. Most economists like Etzioni and Etzioni (1966) believe that the individual is an economic being and economic need motivates him for change. Etzioni and Etzioni said "The mode of production in material life determines the general character of the social, political, and spiritual process of life. With change of the economic production, the entire immense superstructure is more or less rapidly transformed".

However, Leagans (1979) concludes that there are two types of forces which can cause the behavioural change. These are "change incentives" and "change disincentives". He said: "the essence of the behavioural change process is the dynamic interaction of two sets of opposing forces perceived cumulatively as incentives for change and disincentives for change. The opposing influences create tensions that motivate action. Each set of influences,

at a given time and in a given situation, may consist of certain manifestations of many and various forces. Hence, to identify the referents of these two clusters of opposing influences, and the perceived cumulative differential force exerted by each, is to identify the central dynamics of behavioural change".

The arousal of change for Syrian farmers, however, was likely to come from both the pressures from "felt needs" and the pressures from "unfelt needs". Reaching objectives and goals to satisfy their needs are controlled by different factors and conditions.

Syrian farmers in the past, used to cultivate huge areas of land. They used to cultivate part of it and leave the other part as fallow till the following year. The life that they used to live was very primitive and simple. There were no machines, education or even transport to link them with cities. Consequently they had little economic pressures to cope with and there was no incentive to produce more. This was because first of all there were no price incentives and secondly income from farming was divided between the farmers and the liege (landlord). So the primitive lives that farmers used to live, the land tenure (Feudal system) and little economic pressures imposed on them were likely in the past to prevent any change to take place.

However, the rapid increases in the farming community population in Syria for the last two to three decades, the introduction of new technology, particularly mechanization, as well as to the introduction of land reform law put more pressures on land. The amount of land allocated for farmers was smaller than in the past. Consequently, for farmers to keep going in the business, the land that they are cultivating has to satisfy their economic needs in order to meet the new style of living. They can not use the same methods of cultivation that have been used in the past, therefore, they have to adopt new technology.

Economic pressures cannot be the only catalyst for change in Syrian farmer behaviour, many social and psychological aspect could play an equal role for changing their behaviour. These can be self esteem, social group and group belonging, family glorification, education, government support, etc.

3.3 How does the change in behaviour to adopt innovation occur

Schultz (1975) argues that the introduction of a new technology to the individual leads to a period of disequilibrium in behaviour. Learning and experimenting during that period of time would lead towards establishing a new equilibrium level.

The adoption of an innovation as been defined by Rogers (1962) as "the mental process through which an individual passes from first hearing about an innovation to final adoption". Rogers (1983) later redefined the adoption of innovations thus; "The innovation decision process through which an individual (or other decision making unit) passes from first knowledge of an innovation, to forming an attitude towards the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision". Lionberger (1960) said about the adoption process, "the decision to change and adopt innovation is not an abrupt metamorphosis. It is the product of sequence of events and influence operating through time".

So these definitions indicate that the change in behaviour to adopt innovation does not occur at the same time or suddenly. Several authors and researchers emphasise that this change in behaviour to adopt takes place in several steps or stages. For example Ryan and Gross (1943) divided the decision to adopt innovations into four stages; "awareness", "conviction of usefulness", "trial acceptance" and "complete adoption". Giles and Stansfield (1980) suggested nine stages; identifying the problem, assessing its significance, considering the alternative, searching information, evaluating, making a choice, implementing, checking the result, and deciding. Wilkening (1953) conceived four stages in changing behaviour or in the adoption of innovations; "awareness", "obtaining information", "conviction and trial" and "the adoption of innovation". While Rogers (1962, and 1983), Copp, Sill and Brown (1958) and Beal, Rogers and Bohlen (1957) recognize five stages in the adoption of innovations (or in the decision making process to adopt an innovation, i.e. the change in behaviour). The five stages in the decision making process to adopt an innovation by an individual were defined by Rogers (1983) as: "knowledge stage", "persuasion", "decision",

"implementation" and "confirmation stage."

3.3.1 Knowledge stage

Knowledge stage begins when the individual is exposed to an innovation's existence and gains some understanding of how it works.

Three types of knowledge can be identified at this stage. These are:

- Awareness-knowledge: this is the knowledge of the existence of the innovation. In other words, to be aware whether an innovation exists or not. However, some scholars of diffusion like Coleman, Katz, and Menzel (1966) argue that the awareness of the existence of an innovation comes through an incident and the individual is considered as merely a passive receiver. In this case the awareness of the existence of an innovation might motivate farmers to develop a need of it, therefore, he might become interested in it and start seeking more information about it. An example of this can be taken from this current research, some farmers said : "we never looked for a new thing outside our community, we always waited for our neighbours to bring it, if the new thing was good then we might become interested in it and adopt it, if not we tried to forget about it". Other scholars argue that individuals can gain the awareness-knowledge about innovations only through behaviour. The predisposition of individuals influences their behaviour toward the communicated messages and the effect that such messages are likely to have. An individual generally tends to expose himself to ideas that correspond with his needs, interest, existing belief and attitude and tries to avoid the conflicting ones with his predisposition. An individual would not expose himself to messages communicating an innovation unless he perceives the relevance of the innovation to his needs and its correspondence with his existing belief and attitude (Hasinger 1959). Burns (1981) argues similarly, he said "In an attempt to avoid conflict from incompatible ideas and situations, the individual tends to perceive only those elements he wants to". This means that need for an innovation must precede the awareness-knowledge of it. The best example of this is indicated by some farmers in this survey. One said: "I recognized that my traditional varieties of wheat became

non productive or economic, I wondered whether there was an alternative for them, I searched among the farming community about the alternative, I could not find it, I have heard later that the alternative was somewhere else, I went there and brought it back".

- How-to knowledge: Once an individual becomes aware of the existence of the innovation he tries to seek more information about "what is the innovation?", "how does it work?" and "why does it work?". How-to knowledge is concerned with the information which is necessary to use the innovation properly.

- Principles knowledge: this is concerned with functioning principles about how an innovation works. For example the biology of plant growth in response to a fertilizer innovation. However, it is possible for an individual to adopt without the principle knowledge but the chance of rejection is greater because of misusing the innovation.

3.3.2 Persuasion stage

The essential ideal outcome of this stage is to form a favourable attitude about an innovation. In this stage however, the individual becomes more psychologically involved with the innovation and more active in seeking more information about it. An important part of seeking information about an innovation is concerned with the attributes of the innovation such as the relative advantage, complexity and compatibility. The innovation may mentally be applied by an individual to his present or anticipated future. Also, the individual may try to check with his peers whether he is on the right track in his opinion about a new idea or not. And he tries to understand what will be the consequences of applying an innovation and what will be the advantages and disadvantages of it.

As has been mentioned above, the main outcome of this stage is to form a favourable attitude toward the new idea. Favourable attitude has been assumed to lead to change in behaviour and this means that behaviour will be consistent with the attitude held by individuals. This has been mentioned by Reeder (1973) who said "behaviour and beliefs are consistent with one another". This might not happen and discrepancy between attitude or belief

held and behaviour could occur. An example of this can be taken from this current study over the use of chemical fertilizers by Syrian farmers. Some farmers who do not use the chemical fertilizers are convinced that fertilizers increase the yield and they would like to try it. But they cannot do it and so change their behaviour in accordance to the attitude they hold because they lack their own money to buy fertilizers.

3.3.3 Decision stage

This occurs when an individual engages in activities that lead to a choice of rejection or adoption. This is the trial stage for most individuals. An innovation which can be tested would be applied on a small scale by most individuals and the purpose for this is to reduce, as far as possible, uncertainty about an innovation in order to decide to adopt or reject. So a small part of an innovation will be put into use by an individual in order to see how it is functioning in his environment. Most of the Syrian farmers in this current survey reported that they would not apply Sham1 (a recently released variety of wheat) on a full scale in the first year of hearing about it.

Of course, innovations which can be tested on a small scale would be adopted quicker than the one which can not be partitioned. Evidence of research in different countries support this. For example, Ryan and Gross (1943) found that most Iowa farmers insisted on small scale personal experiment before deciding on final adoption. Strassmann (1959) found that experimenting with the industrial innovations on the small scale was very crucial for the adoption of those innovations. Rogers (1983) cited Klonglan *et al.* (1960). They found that passing a free sample of spray weed among Iowa farmers sped up the innovation decision period by a year.

Field demonstrations or Extension plots on farmers' field, by Extension agent or peer group, would be important in persuading other farmers to take the decision to adopt innovations.

3.3.4 Implementation stage

This occurs when an individual puts an innovation into use. Until this stage the decision making to adopt an innovation was a mental exercise.

Although the individual has already made the decision to adopt, a certain degree of uncertainty about the innovation still exists at this stage. Thus an individual will continue to seek more information about the place to obtain an innovation, how to use it, what are the main operational problems to be encountered and how to solve them.

The implementation stage might continue for a period of time and the length of this period depends on the nature of the innovation. This stage would end when there is a diminished identity of the newness of the innovation.

3.3.5 Confirmation stage

At this stage, an individual would confirm whether to continue using an innovation or to stop using it. However, the final adoption by an individual farmer has been defined by Feder, Just and Zilberman (1985) "..... as the degree of use of a new technology in long-run equilibrium when the farmer has full information about the new technology and its potential". If at this stage a state of dissonance would emerge then the individual will try to reduce it by changing his behaviour in order to reach the state of equilibrium.

However, it has to be borne in mind that rejection of an innovation is likely to occur at any of the five stages and the adoption of an innovation does not necessarily follow all stages and with the same sequence.

It has to be remembered that the decision to adopt an innovation can be shaped and modified by several factors or forces which can help that decision to be favourable for change or in opposition to it. Recognising the problem or "felt needs" by an individual is not enough for securing the behavioural change, other forces have to be taken into account. These forces could be internal forces (mental) or external forces (environmental and physical). The extent to which farmers adopt a new idea is determined by these forces or factors. Therefore, the identification of these factors would be crucial for making any desirable change in farmer behaviour. There, however, will be more discussion about these factors after discussing the Self-Concept of farmers. This self image might be one of the factors or forces influencing the decision-making process to adopt an innovation by farmers.

3.4 The Self-Concept

1. What is the Self-Concept?

   Burns (1981) defines the Self-Concept as a "..... dynamic and evaluative picture which each person develops in his transactions with his psychological environment and which he carries round with him on life's journey . The Self-Concept is a composite image of what we think we are, what we think we can achieve, what we think others think of us and what we would like to be".

   Also, Staines (1954) defines the Self-Concept as "a system of conscious percepts, concepts and evaluations of the individual as he appears to the individual. This system includes at the conscious level a cognition of the evaluative responses made by the individual to perceived and conceived aspects of himself. In addition, it includes an understanding of the picture that others are supposed to hold of him, and an awareness of an evaluated self which indicates his notion of the person he would like to be, his conception of the person he ought to be and the way in which he ought to behave". Similarly Rogers (1951) defined the Self-Concept as "an organized configuration of perceptions of the self... It is composed of such elements as the percepts of one's characteristics and abilities; the perception of the self in relation to others and to the environment; the value qualities which are perceived as associated with experiences and objects; and the goals and ideas which are perceived as having positive or negative valence".

2. Self-Concept and behaviour

   So, a view of the individual of himself or herself and a view about how he or she is seen by other individuals that are developed through experience and time is termed as the Self-Concept. The Self-Concept is regarded by many psychologists as a major facet and determinant of every individual's behaviour (Burns 1981).

   The Self-Concept acts as a screen, the permeability of which is determined by the historical development of the individual and the nature of his environment. In a condition which is regarded as stressful for

the individual, the screen becomes a barrier to isolate the individual, consequently he becomes a prisoner of his own ego defence and most of his communicational channels with the outside world would be closed. A few avenues would be left, consequently this would narrow the perceptual field, promoting stereotyped thinking, thereby preventing the individual seeing or trying any new thing (Lazarus, and McCleary 1952). This situation might happen when new ideas are conflicting with the frame of reference defined by the Self-Concept, by which an individual recognizes himself or herself and can help to preselect goals and behaviour. Therefore, when an attempt is made to study farmers' decision making and consequent behaviour (adoption of innovation), it is important to consider that farmers function in an environment bounded by a framework of alternatives which may be acceptable or not acceptable in terms of his or her own identity. Therefore, it is important to identify those images, which generate a frame of reference for every individual to recognize himself or herself and help to preselect both goals and behaviour, among the farming community. The Self-Concept of farmers was found by Seabrook and Higgins (1988) and Higgins and Seabrook (1986) to be an important factor in defining the component of appropriate farming practice.

3. The structure of the Self-Concept

The Self-Concept is the conglomerate of those attitudes which the individual holds, regarding himself or herself, in relation to personally defined variables. In this case, an individual would have an attitude towards himself in terms of progressiveness, shape, intelligence, hard work, confidence, cooperativeness, etc.. The Self-Concept can be changed like all attitudes which can be changed by the dynamics of knowledge and belief. The experience of the individual would help to consolidate or shift his attitude on the relative dimension of the Self-Concept. However, when attitude towards self is established, it would endure like other attitudes. In different environments, different aspects of the Self-Concept come to the fore as determinants of behaviour (Seabrook and Higgins 1988). The Self Concept consists of

three components, these are:

- Cognized Self

  This reflects the point at which the individual perceives himself or herself on the scale of any dimension of the Self-Concept, i.e. "this is me".

  This self furnishes the person with an internally defined identity. In the context of agriculture, because farming is a visible process, an individual farmer tries to recognise and identify with a certain group of farmers, to whom his affiliation would be given, on the light of congruity between his pattern of behaviour and their behaviour. This group would be a reference for his own identity. If for example this group is not interested in change or new ideas then the individual too would reject that new idea for his or her farming in order to retain identity.

- Other Self

  This reflects the point at which the individual perceive others see him or her on the scale of any dimension of the Self-Concept, i.e. "this is how I think that other individuals see me". The Other Self, however, is counted as a major component for the development of the Cognized Self.

  Agricultural occupation as has been mentioned is highly visible and pursued by individuals within a highly judgmental peer group. Practising behaviour like preventing family members taking part in agricultural labour which sometimes is desperately needed, buying large machinery which is not economic to be kept for particular farm, and looking more carefully after the plants which grown on the boundary of the farm are examples of approaching the Other Self in farming.

- Ideal Self

  This reflects the point on the scale of any dimension of the Self-Concept to which the individual aspires, i.e. "this is how I would like to be seen".

> This self furnishes the individual with an internally defined goal in relation to which lies his or her Cognized Self. A number of stereotypes exist in the farmer's own perception and this would help him to define the Ideal Self regarding farming behaviour. Discrete items of behaviour are associated with the existing stereotypes if this behaviour runs contrary to the existing stereotypes regarding the Ideal Self then this would attack the individual's own Self-Concept. This would happen when a new idea or research runs contrary to the Ideal Self. Under these circumstances, the individual has to reject the behaviour, amend his or her Cognized Self, adjust his or her Ideal Self or soften the symbolism of that behaviour in his or her own perception (Seabrook and Higgins 1988).

All the three components of the Self-Concept are necessary in any decision to adopt, reject or compromise a quantum of behaviour.

In the context of Extension and training, however, the Self-Concept may help one to understand why some farmers are more enthusiastic to change and other are resistant to it. Every individual has a view of himself or herself and he or she tries to interpret all the available information in the light of his or her Self-Concept. For example if someone perceives an innovation as for the progressive type and he identifies himself as a traditional type then he would not adopt. The research information declares the state of tension. If this new information is not consistent with the individual's views then an attempt is made to reduce the dissonance by ignoring the information, trying to interpret that information to be consistent with the Self-Concept, changing the self to be compatible with it, or justifying the Self-Concept (Seabrook and Higgins 1988).

The components of the Self-Concept, like attitudes, are very difficult to change. Therefore, if the Self-Concept appears to be a real inhibitor to change, then ideas and material for change have to be presented in a way which cannot conflict with the Self-Concept rather than to try to change the already existing view of the self.

3.5 Theoretical and empirical evidence for factors associated with the adoption of innovations

Factors associated with the adoption of innovations and new technologies can be classified into seven factors, socio economic, personal, sociological, institutional, communicational, cultural and psychological factors.

Empirical evidence, particularly from developing countries, for these factors is numerous and to some extent has shown contradictory results. This is possibly due to the differences in circumstances from one country to another in relation to these factors. However, neither the adoption process nor the factors associated with the adoption are independent from each other. The adoption of innovations is a process in which physical and mental activities are involved and takes place over a period of time. During that period a host of factors interact and affect the adoption process to be in favour or against the change.

Studying farmers' behaviour to adopt or reject innovations have emerged from various disciplines of the social sciences. Contributions on the extensive literature on the diffusion and the adoption of innovations have been drawn from economics, sociology (with rural sociology predominating), social geography and to a minor extent from psychology disciplines. Each discipline, however, to a large extent has studied and researched the adoption process in divergent paths with generally little interaction among them. Therefore, the need to adopt a multi-disciplinary approach for modelling the adoption behaviour of farmers has emerged. (Ongkili and Quilkey, 1983).

A multi-disciplinary approach for modeling the adoption behaviour of farmers was used by some researchers, for instance Freeman (1976), Long (1979) and Ongikili *et al.* (1983). Ongkili *et al.* used this approach to study factors that influence the adoption behaviour of Malaysian farmers. They applied a multi-disciplinary approach by using different sets of adopting factors (economic, sociological, geographical, psychological, cultural and institutional) which were generally accepted as determinant factors for adoption, to draw an integrated model for adoption behaviour of Malaysian farmers. Andrew and Alvarez (1982) reviewed literature on socio-economic factors associated with the adoption of agricultural technology. They conclude that

most sociologists and economists ultimately agreed that an integrated group of factors affecting the adoption of innovations are not well understood and varied from one farm to another. Therefore integrated socio-economic research must consider the entire decision environment of farmers and technological innovations.

Most of the empirical evidence for factors associated with the adoption of innovations were concluded only from dichotomous terms, i.e. adoption or rejection, in other words the studies never considered the degree of use of an innovation, for example how much land is devoted to the high yielding or improved variety. However, the evidence from this research thesis can be used as a guideline to help in developing an integrated model for the Syrian conditions.

Since this survey emerges from a developing country, and since it is not possible to review all studies concerned with the explanation of the pattern of adoption behaviour, this review is restricted to the experiences of developing countries and is representative of recent work.

3.5.1 Socio-economic factors

These include factors like labour shortage, livestock, soil type, cash crops, cost of innovations, the price of the product, fragmentation etc..

The economist's views about the adoption of innovations is that the decision to adopt an innovation is an economic one, i.e. farmers would not adopt an innovation without getting some relative advantages. Benefits, costs and profit are considered to be important variables for explaining the adoption pattern. However, empirical evidence from Puebla, Mexico by Gladwin (1977) showed that input-output (cost-profit) ratio of at least 1:2 is necessary to shift from traditional to new technology. This does not mean that economic models are purely concerned with the economic issues. Some researchers like Chaudhari (1979) incorporated education in their models and others like Linder and Pardey (1979) used information factors. However, economic aspects such as profitability were considered by Fitch and Nordblom (1977) as a good starting place in rain-fed farming but they insisted that the economic aspects are not the only ones to influence farmers' adoption behaviour in that environment.

Farm size is one of the first factors to be empirically investigated by researchers. The relationship of farm size to adoption of innovations depends on labour requirements, land tenure, fixed cost of adoption, human capital, credit constraint, risk preference and so on.

Empirical evidence about the role of farm size shows contradictory results. For example, Barker and Herdt (1978) in an Asian country, have studied the relation between the adoption of new rice varieties and farm size, they found a negative relationship. This result has been confirmed by Hayami (1981) when he studied the same relation in the same country. Binswanger (1978) reviewed several studies about the adoption of tractors in Asian countries, he concluded that farm size and the adoption of tractors were always related positively and significantly. Also, Muthia (1971), Schluter (1971) and Sharma (1973) concluded from their studies in India that small and medium farms adopt high yield varieties more than large farms. While Jamison and Lau (1982) in Thailand found that adoption of fertilizers was related significantly to farm size. The same results have been reached by Gafsi and Roe (1979) in Tunisia, they found that inadequate farm size impedes the adoption of certain types of irrigation equipment such as tube wells and pumps. Garvin (1980) in Salisbury South, Notron and Beatrice, found that the high rate adopters among tobacco growers tended to be larger farmers, to have a better farmyard appearance, live closer to Salisbury, were more innovative, and have greater knowledge of research recommendations. Kleynhans and Lyne (1984) and Lyne (1985) found that the cultivatable land area per member in the family, the number of cattle possessed by the family and the number of adult migrant labourers in the family were the most important factors for discriminating accepters and non accepters of innovations in Amaci area in Southern Kwazulu. Mahammad (1978) found that size of holding, tenure status, irrigation facilities, availability of credit and input were the most important factors affecting the adoption of innovations by farmers in India. Also Singh and Pandey (1981), in India, found that farm size was one of the factors that affected the performances of farmers. However, Basabrain (1983) in Saudi Arabia did not find any relation between farm size and the adoption of fertilizers, high yield va-

rieties of wheat or insecticides. The same findings were confirmed by Greene (1973) in Thailand for the adoption of tractor cultivation and Alviar (1972) in Philippines for the same innovation.

Soil type is also considered to be an important factor for the adoption of innovation. For example Gladwin (1980) in Mexico suggested the importance of land quality in explaining the adoption behaviour of farmers. Burke (1979) in Mexico found that the adopters of the "Green revolution technology" are more land intensive when soil quality is taken into account. Also, Ashby (1982) stresses the role of ecology as an important factor for the diffusion of innovations among farmers in Nepal.

The shortage of labour in the peak season lead farmers in the Philippines to adopt new technologies (Alviar 1972). Spenser (1976) in Sierra Leone has reached the same finding for the same innovation. While Harriss (1972) conveyed a different message, he found that the scarcity of labour has prevented the adoption of high yields varieties by Indian farmers. Falusi (1974) however, found no relation between labour availability and the adoption of fertilizers by Nigerian farmers.

Smock (1969) emphasized the role of land tenure, owned land, as an important factor for agricultural development in Nigeria. This has been supported by Francis and Atta-Krah (1988) when they studied the adoption of Foodet Brouse trees by Nigerian farmers, they found that soil fertility, management of crop rotation, division of labour, decision making within the household and land tree tenure system were the main constraints for the adoption.

The price of the product has been reported by Basabrain (1983) to be positively and significantly related to the adoption of fertilizers, high yielding varieties and insecticides by Saudi farmers. Parshad and Singh (1980) found that high cost of gypsum, non availability of loan, high cost of fertilizers, insufficient water supply, lack of technical knowledge, lack of family labour, and lack of implements were the most crucial obstacles in front of Indian farmers to adopt alkali soil reclamation technology. Also Falusi (1974) reported that the price of maize related positively and significantly to the adoption of fertilizers by Nigerian farmers. However, number of implements

and equipment owned by the farmers were reported not to be related to the adoption of improved practices by Iranian farmers (Najafi 1978).

Concerning the cost of the innovation, Fliegel and Kivlin (1962a, 1962b) and Fliegel and Kivlin (1966) studied the effect of different sets of factors on the rate of the adoption. Among these factors was the cost of the innovation. For the three studies they did not find any significant relation and in fact they found a trend in opposite direction.

Farmer income is considered to be crucial for the adoption of an innovation. This income could come from rain-fed crops, irrigated crops, trees, livestock, renting machinery to others and so on. The higher the income the more adoption of new technology would take place. However, Basabrain (1983) found that farmers' income was related positively to the adoption of innovation by Saudi farmers. While Lasley and Bulena (1986) did not find income as a related factor for the adoption of eight new technologies by Iowa farmers. A negative and significant relation was found between the level of farmers' income and the adoption of goats by farmers in India (Punia and Punia 1982), this was because people look down on individuals who raise goats.

3.5.2 Personal Factors

These include variables such as age, education, family size, family type, family education, years of farming, residency away from home, cooperative membership, the wife's involvement in the decision making process and so on.

The introduction of new technology requires farmers to increase the value of their entrepreneurial ability, such ability is defined as "the ability to perceive, interpret, and respond to new events in the context of risk", (Schultz, 1981). Welch (1978) argues that the contribution of human capital to the return from agriculture could be attributed to allocative ability (managerial ability) and worker ability. These two abilities add to experience. (Shultz, 1981). Allocative ability however is hypothesized to be increased or developed more than worker ability by formal schooling. This has been supported by several studies. For example, Ram (1976) found that farmers' education was related positively and significantly to their production, while worker ability was not. Gerhart (1975) found a positive and significant relation

between the education and the adoption of maize by Kenyan farmers. Also Rosenzweig (1978) for the adoption of fertilizers in India, O' Mara (1980) for the adoption of high yield varieties in Mexico, Mohamed (1982) for the adoption of seven innovations in Sudan, and Cutie Tula (1975) for the adoption of hybrid corn in El-Salvador reached the same conclusion about the relation between education and the adoption behaviour of farmers, i.e. a positive and significant relation. Punia and Punia (1982) found a negative relation between education and the adoption of goats by Indian farmers (Haryana). While Saha, Malhotra, and Krishna (1981) for the adoption of high yield varieties of wheat, fertilizers and insecticides in India and Najafi (1978) for the adoption of improved practice in Iran and Villaume (1978) in India found no relation between education or literacy and the adoption behaviour of farmers.

Age of farmers is also considered by researchers to explain the adoption behaviour of farmers. It is commonly believed that elderly farmers reject change because they fear risking their prestige and status. Also very young farmers are less enthusiastic to change because of the weakness in their financial position. However, middle aged farmers are believed to be more ready for change. This notion has been supported by Copp, Sill and Brown (1958). However, Basabrain (1983), and Lasley and Bulena (1986) found that age related negatively and significantly with the adoption behaviour of farmers. While Adhikari and Patel (1986), for the adoption of paddy cultivation technologies in Nepal, and Punia *et al.* (1982) found age related to the adoption behaviour of farmers. Tiffen (1973) for the adoption of ox-plough in Northern Nigeria and Mohamed (1982) found a positive relation between the age of farmers and the adoption behaviour.

Concerning the role of family size, the notion here is that large sized families might have no problem with labour supply which might be necessary for the adoption of some innovations. Tiffen (1973) found a positive and significant relation between the size of family and the adoption of ox-ploughs by Nigerian farmers. While Adhikari and Patel (1986), and Mohamed (1986) found no relation between the family size and the adoption of innovations. Saha, Malhorta, Krishna (1983) found a positive and significant relation

between family type and the extent of adoption by Indian farmers in Rajasthan. While Punia *et al.* (1982) did not find a significant relation.

Copp (1956) found no significant relation between residency outside home village and years of farming on the one side and the adoption of farmer practice on the other side. Also, Adhikari *et al.* (1986) supports that view. While Basabrain (1983) found a negative and significant relation between years in farming and the adoption behaviour of farmers. Najafi (1978), however, found a positive and significant relation between years of farming and the adoption of improved practices.

Mungate (1985) found that women in Chitomborwizi and Vuti small scale commercial areas of Mashonland west province of Zimbabwe were playing a big part in adopting innovations related to cattle and crop practices.

3.5.3 Sociological Factors

These include variables such as the role of the opinion leader, reference group, family involvement in the decision making process and social participation.

Sociologists have paid attention to distinguishing the categories of adopters in an attempt to provide an explanation of the decision maker. Further, the discussions on the adoption process are made generally within the larger context of the diffusion process, (Ongkili and Quilkey 1983).

An individual does not exist in isolation. First of all, he or she belongs to the family and at the same time he or she is a member in the social system. There are roles and expectations for individuals to play or perform, as well as to norms and value that have to be followed. This would play an important effect on individual's behaviour either in relation to their membership in the family or in relation to a social system.

The opinion leader has been identified by sociologists as an important factor for influencing other individual s behaviour and attitudes (e.g Rogers and Shoemaker 1971). The opinion leader in developing countries could be a head of the village, a progressive farmer or an influential farmer. The theory about the opinion leader is that he or she might be an early adopter of innovations because the early adopters of innovations are generally characterized by having the capacity to obtain more information than the other

individuals. Similarly the role can be exploited by the Extension service to encourage adoption by using the opinion leader, who will then influence others.

However, not all leaders are opinion leaders and not all help the change. For example in Eastern Nigeria, Smock (1969) found that community plantations failed because there was no leadership in some communities and in other communities leadership was an obstacle for community agricultural projects. Also, Garvin (1981) stressed the importance of leadership in disseminating agricultural information through organizing and managing the group discussion in Zimbabwe.

Group membership, clique membership or reference groups to whom farmers belong also have their effects on farmers' adoption behaviour. The extent of these effects depends on the ties of farmers to these groups and on the extent to which farm practices are group sanctioned (Marsh and Coleman 1954). Falusi (1974) found a positive and significant relation between the cooperative membership and the adoption of fertilizers. Coughenour (1960) also found a positive and significant relation between the participation in a farm bureau and the adoption of improved practice. Clyburn (1978) highlighted that the willingness to change among the livestock owners in west African Sahel is tempered by the degree to which an alternative is consistent with norms and values of the social system and the goal of authority figures of the system. Saha, Malhortra and Krishna (1981, 1983) found a positive and significant relation between adoption behaviour of farmers and their level of social participation. While Punia and Punia (1982) found a negative relation.

The neighbourhood is said to be an important factor for influencing the adoption behaviour of farmers. Marsh and Coleman (1954) found the adoption of innovations was related positively to the influence of neighbourhood. Lindstorm (1958) found that the major factor to cause the adoption among Japanese farmers was the observation of good results obtained by other farmers, the use of the Extension agent and neighbours. Young and Coleman (1959) reported that farmers in some neighbourhoods say they are more frequently guided in their farming practices by the influence of neighbours.

Concerning wives' involvement in the decision making process, Sawer (1973) found that husbands had a major decision role in all decisions studied, such as borrowing money, new varieties, machinery and so on. But she found that joint decision making was important in matters such as buying land, borrowing money and adopting new crops. Further, the wives' involvement in the decision was found to be greater in the awareness stage than other stages in the adoption process.

3.5.4 Institutional factors

The decision making to adopt an innovation is also influenced by factors that originate from the farmers' institutional environment. Some of the important factors are the Extension service, the accessibility of inputs, credit, marketing, and the infrastructure such as transport and irrigation. Hazell (1982) stated that protracted difficulties in getting chemical inputs and differential access to credit might act as a barrier for adoption. Binswanger, Dayantha, Balaranaia and Sillers (1980) maintain that differences in external constraints such as the Extension service and marketing are more crucial in explaining the adoption behaviour of farmers than the differences in attitudes to risk.

Feder and Zilberman (1985) emphasized the importance of credit and capital for the adoption of innovations. They said "capital in the form of either accumulated savings or access to capital markets is required to finance many new agricultural technologies. Thus, differential access to capital is often cited as a factor in differential rates of adoption". This has been supported theoretically and empirically by researchers eg., Lowdermilk (1972), Lipton (1967), and Bhalla (1979). Carrilo-Huerta (1976) found that credit was the most important factor affecting the adoption behaviour of Mexican farmers. Chaudhari (1977) argued that marginalization for small farmers was the main constraint for the adoption of agricultural innovations in Pakistan. Misiko (1976) found that availability of credit, technical guidance, increase in yield, availability of inputs, family labour, usage of hybrid maize by neighbours and availability of better seed were the most important incentives to relate with the adoption of farmers concerning maize production in Kenya.

McClymont (1979, 1982) found that the cost of innovations and the characteristics of innovations were found the most important factors affecting the rate of adopting innovations related to tobacco crops in Zimbabwe. Others argued that lack of credit alone does not inhibit the adoption of innovations. Schutjer and Van der veen (1977) cited several scholars who singled out the high profitability of high yield varieties and its low cost which will persuade even small farmers to look for credit and adopt the innovation.

However, several studies have shown that lack of credit does not limit the adoption of new technology, for instance, Bhalla (1979) reported that 48% of small farmers and only 6% of large farmers reported that credit was the main constraint for adopting fertilizers. Also, Wills (1972) in India and Khan (1975) in Pakistan, and Mohamed (1978) in India found that the lack of credit was a problem for adopting new technology such as chemical fertilizers.

Ongkili and Quilkey (1983) found that institutional factors were the best factors in discriminating adopters and rejectors for new varieties of rice in the Bahagia and Jaya areas of Malaysia.

3.5.5 Communicational factors

The word communication comes from the Latin "Communis", common. When we communicate we are establishing "Commonness" with somebody. That means we are trying to share information, an idea or an attitude (Schram,1954).

Rogers (1983) defines communication as "the process by which participants create and share information with one another in order to reach a mutual understanding". Also Leagans (1963) defines it in a similar way, he said "the process by which two or more people exchange ideas, facts, feelings or impressions in ways that each gains a common understanding of the meaning, intent and use of a message".

Rogers (1983) explains that the innovation-decision process is basically an information-seeking and information-processing activity in which individuals are motivated to reduce uncertainty about advantages and disadvantages of the innovation. Information about an innovation can be obtained from interpersonal channels and mass media channels. Mass media, such as

radio, television, and publications compared to interpersonal channels, such as change agent contact, can reach large audiences at a high speed, create knowledge and lead to change in a weakly held attitude. Interpersonal channels are considered to be better in formulating and changing a strongly held attitude. Information technology, however, has a great potential role to play but the lack of understanding of it as well as to planning and policy issues make it less effective nowadays (Garforth: 1986; Angell: 1986; and Blokker: 1986).

It has been generalized that mass media channels are relatively important at the knowledge stage of adoption while interpersonal channels are relatively important at the persuasion stage. This generalization has been supported by Beal and Rogers (1960) when they have studied Iowa farmers. They found that bulletins, farm magazines and container labels were more important than interpersonal channels at the knowledge stage. However, this generalization has not been supported in developing countries. For example Rahim, (1961, 1965) found that mass media channels were hardly mentioned as a source for information about innovations by Bangladesh farmers while interpersonal channels were very important.

Also, Rogers (1983) has generalized that cosmopolitan channels are relatively more important at the knowledge stage while local channels are more important at the persuasion stage. Some research findings support this generalization and some do not, particularly for developing countries. However, interpersonal channels could be either cosmopolitan or local while mass media are almost entirely cosmopolitan.

Some empirical evidence from the field show the importance of knowledge, contact with extension service and the contact with other source of information for the adoption of innovations. For example, Al-Haji and Hammad (1969) found that contact with extension agents, farm size and education, related positively and significantly with the adoption of innovations, Olive trees by Lebanese farmers. Also, Adhikari and Patel (1986), Falusi (1974), Junghare (1962), Gerhart (1975), and Mook (1971) found a positive and significant relation between the contact with extension agents and the adoption behaviour of farmers. Okafor (1984) emphasized on the impor-

tance of mass media and personal channels in persuading farmers to adopt innovations in Bendel State of Nigeria. However, Punia and Punia (1982) found a negative relation between the contact with extension agents and the adoption of goats. While Dean, Aurbach and Marsh (1958) found no significant relation between contact with extension agents and the adoption of corn growing for the high "rationality" farmers. Farmers with low "rationality" level, however, have been affected by their contact with Extension, i.e the adoption of corn practices were related positively to farmers contact with Extension.

Gross and Taves (1952) and Coughenour (1960) found a significant relation between reading bulletins and the adoption of innovations . Saha, Malhotra and Krishna (1983) found a positive and significant relation between information source (media, interpersonal channels) and the extent of adoption of innovation by Indian farmers in Western Rajasthan.

3.5.6 Cultural factors

"Much is written concerning cultural factors in economic development but few studies have specifically addressed the role of these factors in the adoption of new technology at the micro level". (Ongkili and Quilkey 1983). Cultural factors such as family glorification, the value placed on hard work, folk beliefs and the strength of traditions are generally recognized to either help change or to inhibit it.

An example of the negative effect of the cultural factors came from Clawson and Hoy's (1979) case study. The reason for not adopting the innovations of the "Green Revolution" by the Nealtican peasant of Mexico was investigated within the cultural and physical context of the local environments. Also, Ongkili *et al.* (1983) found that communication, risk and culture were able to discriminate between adopters and rejectors of a new rice variety, in Malaysia. Punia and Punia (1982) found a negative relation between caste and the adoption of goats in India. While Copp (1956) found that nationality, religion, residency, experience, age and family were not associated with the adoption of farm practice in Kansas.

In eastern Nigeria, Smock (1969) observed two type of forces, positive and negative, related to the agricultural development. The first one (pos-

itive) is the cultural and attitudinal factors encouraging the development. They were; prestige and status, (to become rich), money bringing happiness, owning land, glorifying the family, not believing in superstition, the value placed on hard work, and the value placed on teaching their children. While the negative forces were; the strength of tradition, the self image, folk beliefs, leadership and land tenure.

3.5.7 Psychological factors

These include variables such as perception, attitude, motivation, orientation, achievement and risk. A number of factors are at work to determine the decision to be taken, but the decision to adopt an innovation is characterized as psychological in nature. The conventional stages of farmers' decision making to adopt innovation are the recognition of the problem or the arousal of motivation to change, selecting the solution to the problem that can satisfy the needs that has arisen from motivation, and finally integrating the decision taken, (Jones: 1975). However, the individual's capacity , as a decision maker, to recognize and define the problem and to search for a solution is determined by his or her psychological characteristics, namely motivation and perception. Motivation can also be found as personal aspiration and ambition to achieve or succeed in certain ways, as well as to another type of motivation which involves the desire to exploit opportunities that can offer the possibility of high personal satisfaction. Motivation of this might result in consideration and adoption of innovations (Ongkili *et al.* 1983).

It was indicated at the beginning of this chapter that there are two types of risks that can be encountered in the farmers' environment; subjective risk which is concerned with the uncertainty about using a new technique and objective risk which is concerned with weather variability, credit, availability of inputs etc..

Risk is very difficult to measure, therefore it is not well investigated Feder and Zilberman (1985). Risk can be assessed through dummy variables such as rainfall and soil fertility (Colmenares 1976 and Cutie Tula 1975). While others like O'Mara (1980) and Binswanger; Dayantha; Bularanaia and Sillers (1980) put more emphasis on the perception of risk through direct interview.

Subjective risk about a new technology can be reduced by exposure to

information while other aspects of risk, such as capital risk, can be reduced by introducing credit and subsidy programmes. In addition to risks in yield and price which were dominant for a long time in traditional farming, the capital risk is considered to be important nowadays as well. Two aspects of capital risk have been identified; first, the "liquidity management" concept, i.e. the ability to allocate the credit among different enterprises, Baker and Bhargava (1974), and second, the "financial risk" Gabriel and Baker (1980). However, the "liquidity management" concept is ignored by most of the credit programmes because credit has been introduced to farmers by kind and not by cash, therefore, the credit impact on the adoption of new technology might be small (Ongkili *et al.* 1983).

Empirical evidence for the role of the psychological factors in the adoption of agricultural innovation can be concluded from several studies. For instance Moulik, Hrabovszky and Rao (1966) found that farmers' attitude towards chemical fertilizers (nitrogen), self-rating of economic motivation, self-rating of closeness with Extension workers and self-rating of innovation were significantly related to the adoption of chemical fertilizers in North India.

Purohit (1963) studied 180 book-keeping farms in Finland. The primary purpose of this study was to test the hypotheses that the human ability variation of farmers is related to their adoption of the farm practice. He found that innovators of a younger age, with less years in farming, had a higher mental ability, read more farm magazines and news papers, had a larger participation in educational programmes, and had more committee membership in the farm organisation, and had families with more decentralized outlook and more socializing experience than later adopter groups.

Hoffer and Stangland (1958) studied farmers' attitudes and values in relation to four corn growing practices. They found in general that if a farmer is efficient, has initiative (risk taker), and is progressive, he is more likely to adopt, while on the other hand, if he is conservative (traditional) and values security highly he is more likely to delay in adoption or might never adopt. Okuneye (1984) found that risk aversion, less contact with extension, and lack of capital were the most influential factors among other

factors in determining adoption of innovations by farmers in Nigeria. Bond and Wonder (1980) found that attitude towards risk was a very important factor in agricultural sector of the Australian farmers. Hamal and Anderson (1982) found that farmers in Neapal in general were aversive to risk and the degree of risk decreases as the wealth of farmers increase. However, Thornton (1989) found that risk had no effect on the adoption of sow ing grass-legume for long term leys among beef farmers in Colombia. Also a similar finding was found by Wan and Anderson (1990) amongst Chinese farmers. The failure to find risk as an important factor was attributed to the failure in measuring farmers' risk assessment properly.

More recently, Higgins and Seabrook (1986) and Seabrook and Higgins (1988) studied the role of the farmers' Self-Concept as a determinant factor for the adoption behaviour of farmers. They conclude that the farmer's concept of himself as a decision maker defines the components of appropriate farming practice.

3.6 Conclusion

- Psychologists have paid little attention to the adoption of innovation by farmers. Therefore there is need to consider more psychological aspects in order to use an integrated approach to the decision making process.

- The degree of the use of an innovation (for example how much land is devoted for high yield varieties at the expense of a traditional one) is rarely applied for discriminating between farmers.

- The adoption of innovations still lacks an integrated model for the possible factors that influence the decision making process.

- Economic factors are no longer the only ones to influence the adoption behaviour of farmers, non-economic factors have an important role to play in that respect. Because non-economic factors are difficult to measure, their potential as important factors for the adoption of an innovation is yet to be discovered. This would depend on how efficient the tangible measurements used are and how these measurement are carried out and handled by researchers.

These conclusions are going to be considered further in this study. The next chapter describes the research approach and the wide range of factors to be considered. This lays emphasis in the psychological aspects and recognises the difficulty in collecting such data for the Syrian farmers. The need to collect such data is highlighted by the lack of any real research on the psychological and social aspects of Syrian farmers.

CHAPTER 4

Research Methodology

4.1 The study area

The survey was carried out in the Northern and Eastern part of the country, specifically, in Aleppo province to the north and Hassakeh province to the east. It covers nine districts (Manatik), 18 sub-districts (Nawahi) and 30 villages which were used for drawing the sample of farmers. (See Fig 4.1). This chapter, in part, outlines the findings about the villages and the study area. This was done as a preliminary piece of work prior to the visits.

The two provinces, particularly the Hassakeh province, are very important areas for both irrigated and rain-fed farming. In terms of growing wheat, which is the main concern for this study, generally the two provinces cover more than half of the cultivated area of wheat in the country. For example in 1984, 58% of the cultivated wheat rain-fed and irrigated area in the country was in Allepo and Hassakeh, while in terms of rain-fed only, this percentage increased to 61%. (AASA 1984).

The five settlement Zones which have been discussed in Chapter 2 can be seen in both Aleppo and Hassakeh provinces. The study area however, was concerned with the first and second stability Zones. More specifically, in areas which receive an annual rainfall of just above 300 mm to just above 500 mm. (See Table 4.1 for the distribution of the amount of rainfall).

While the farming system in Aleppo and Hassakeh varies, several cropping systems have been identified in the study area, wheat is the first and the most dominant crop in the system for most farmers. (Table 4.2 shows the result for a random sample of farmers).

In general terms, farmers are living in groups or families which are linked together into a small number of lineages. Three types of families can be recognised. Nuclear, polygamous and joint or extended families, (these three

The administrative structure of the sampled villages

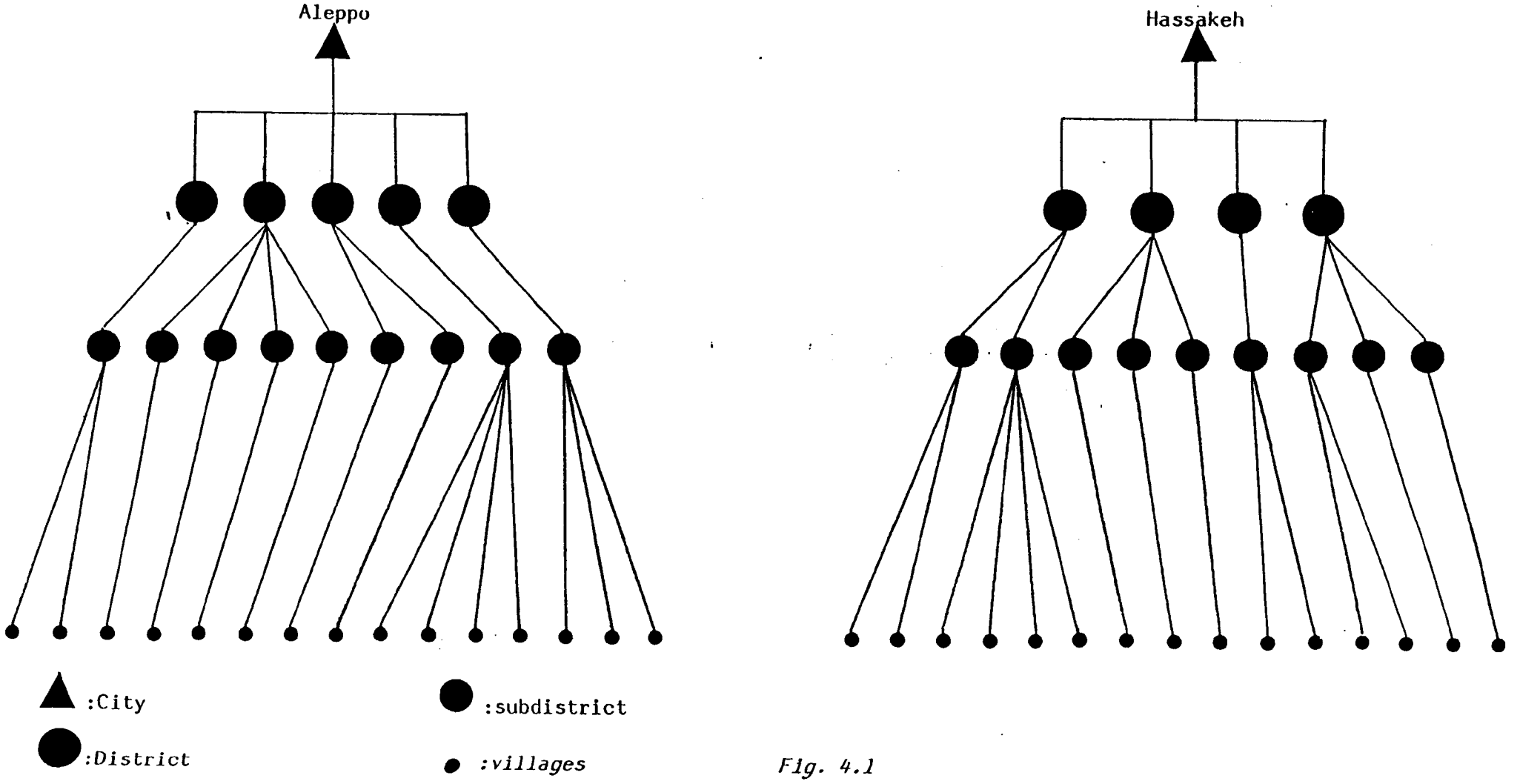


Fig. 4.1

Table 4.1: The distribution of rainfall in the study area for ten years mm

Location	1975-76	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85
Aleppo (city)	516	377	375	261	438	374	340	332	200	334
Izaz*	479	435	401	209	455	429	348	287	369	474
Afreen*	580	510	425	251	536	423	350	352	308	459
El-Bab*	358	318	310	244	366	228	319	297	168	267
Jabal Samaan*	-	-	-	-	-	-	-	-	-	-
Sfereh*	333	329	228	181	319	290	263	258	157	257
Harem*(1)	607	691	452	430	629	507	-	460	309	479
Hassakeh (city)	328	161	234	234	307	332	258	280	148	293
Al-Qamishli*	488	151	439	327	553	530	468	373	237	365
Al-Malkiyeh*	588	314	678	389	636	590	562	461	342	537
Ras El Eyen*	446	228	368	172	292	393	262	314	195	306
Amouda**	512	228	509	252	450	446	461	336	246	515
Derbassieh**	549	243	421	277	377	412	485	311	192	436

*: District; **: Sub-District; (1): In Idlib province. Source: SA, 1984

Table 4.2: The distribution of farmers by cropping system

Cropping system	No.	%
1.Cereal/ legumes/ Summer crops/ trees	10	17
2.Cereal/ legumes/ Summer crops/ fallow	5	8
3.Cereal/ Summer crops/ trees	1	2
4.Cereal/ legumes/ Summer crops	16	27
5.Cereal/ Summer crops/ fallow	5	8
6.Cereal/ legumes/ fallow	9	15
7.Cereal/ legumes	3	5
8.Cereal/ fallow	11	18

types are similar to those found by Sweet (1960) in one of the Syrian village in Aleppo). The distribution of these three types of families varies from one village to another and from north to the east. In the east the extended and polygamous families are more significant than in the north. The influence of the leader who is usually the informal head of the village (Mukhtar), in comparison with the past is decreasing amongst the farming community but he still has a role to play. The degree of the influence of the leadership varies from village to village and from one person to another. For example the young generation are less influenced by the leadership than the older ones, Kurdish villages are influenced more than other villages.

The majority of farmers in the study area are dependent completely on agriculture while very few have additional jobs to farming.

Most of the studied villages in Aleppo province are linked to the main roads with paved access, while in Hassakeh province very few villages have been found to have paved access to link them with the main roads. The closest main paved roads for the villages in Hassakeh were found to be not less than two km. This would make the communication with these villages, particularly during the winters, very difficult and no transport can move except tractors and mules, horses or asses.

Very few villages were found to have Extension services situated in them, although the trend of the late 1970s was to locate one Extension agent in each cooperative as well as building several Extension village units in big villages (Bakour 1978). If farmers want help and advice from Extension then they have to travel to other villages, Nawahi, Manatik, or Muhafazat, on average a distance of 12 km.

Most farmers who are cooperative members get their inputs from their village cooperatives while other farmers who are not members have to travel on average a distance of 25 k.m..

Three isohyet lines, 300 mm,[1] 400 mm, and 500 mm were selected in order to facilitate the identification of the sampling villages, and to pick out groups of villages with similar climatic conditions. In these villages

[1] All the selected villages were identified to be above the isohyet line in order to increase the likelihood that the fields of the sampled villages are receiving not less than 300mm annual rainfall.

rain-fed wheat farmers are encouraged to use fertilizer, herbicides, improved wheat varieties and other practices which are included in this study.[1] All villages located on these lines were identified for two provinces, Aleppo and Hassakeh (El-Jazerah). Five villages along each line in each province were selected taking into consideration that they were almost equally distributed on each line. This brought the total number of villages to 30, covering 9 districts and 18 sub-districts. (See Map 4.1).

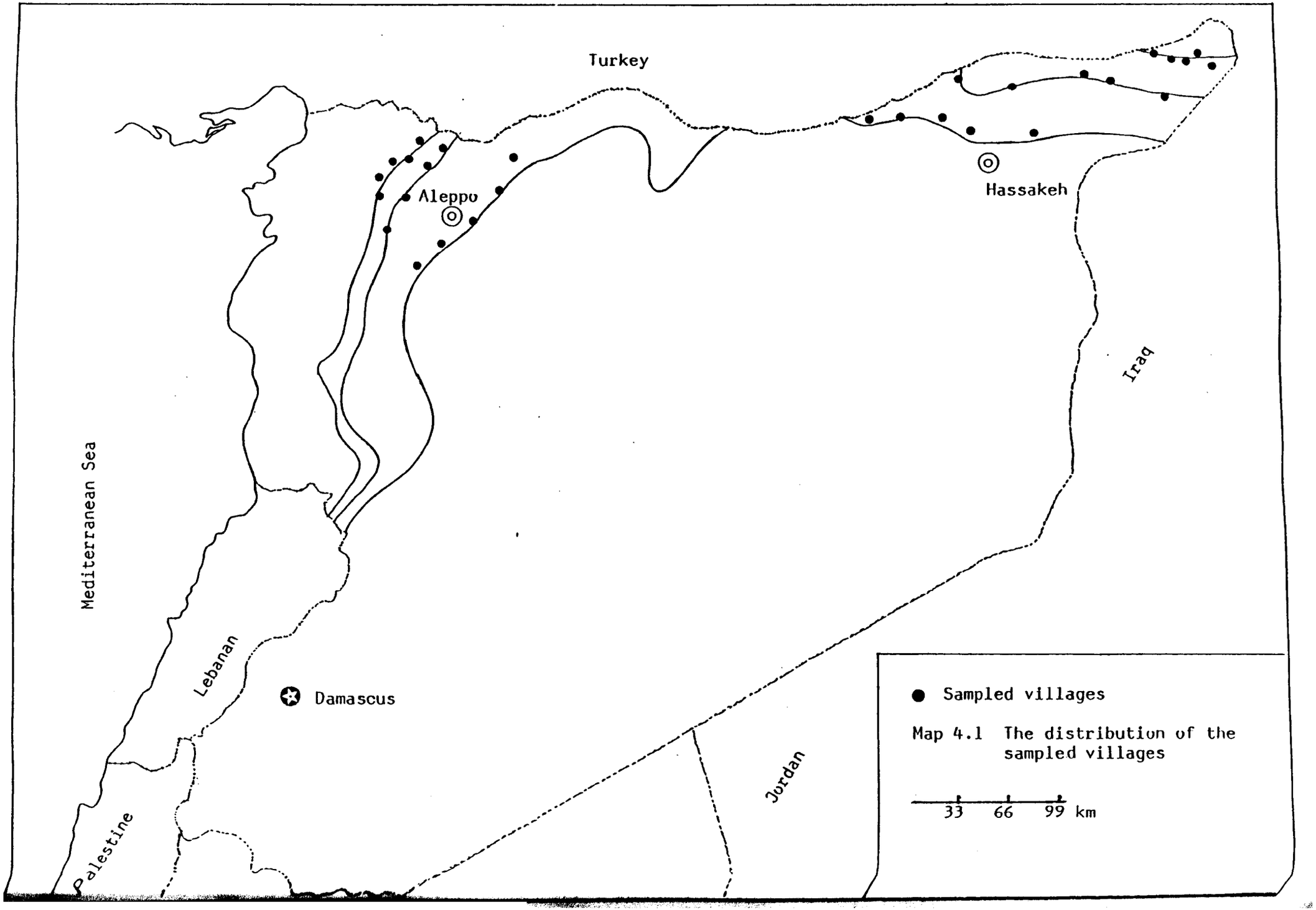
The Departments of Agricultural Extension at the Agricultural Directorates in Aleppo and Hassakeh were consulted for the following purposes: to locate the geographical position of the village, identify whether farmers in that village were growing wheat and to find out about the geographical location of the Extension units providing these villages with services.

Recommendations on agronomic practices for wheat growing (such as the time of applying nitrogen, amount of nitrogen and phosphate, recommended seed bed preparation method, time of herbicide application, sowing method etc.) were obtained from the Agricultural Extension Department and Research Department in the Ministry of Agriculture and Agrarian Reform in Damascus. Other sources of recommendations, such as the Extension Department and Research Department in Aleppo and Hassakeh, as well as, individual Extension units serving the sampled villages, were contacted. It was found that the national and local recommendations were relatively similar (see Appendix B). This corresponds with the conclusion of Manzardo (1980) in a review of the agricultural information system in Syria. This conclusion was that "very seldom are local modifications to standard recommendations in amount or type of input made". This is clearly a weakness of the Extension system.

4.2 Questionnaire pre-testing

The questionnaire was pre-tested three times by questioning wheat farmers outside the villages selected to be used for the main interview. Each time six farmers were interviewed and the outcomes of these interviews were taken into consideration and used to revise and modify the scheduled questionnaire, especially in terms of the time required to complete and the space needed, local dialect and units of measurement. Some questions that were

[1] Although Research and Extension recommend farmers in the study areas (based on their adaptive experiments) to use chemical fertilizers, different improved varieties of wheat, herbicides, pesticides, specific method of seed bed preparation, sowing machine etc, this does not mean that these recommended practices and innovations are relevant to every farmer. See for example Rogers (1976), Havens (1972) and Golding (1974).


Turkey
Aleppo
Hassakeh
Iraq
Mediterranean Sea
Lebanan
Damascus
Jordan
Palestine
Sampled villages
Map 4.1 The distribution of the sampled villages
33 66 99 km

difficult for farmers to understand were simplified.

4.3 Approaching the village and selecting the sample

During the survey which started in November 1987 and ended in February 1988 two of the selected 30 villages, one in Aleppo and the other in Hassakeh, were replaced with two other villages (taking into account the need not to deviate from the main isohyet line). This replacement was necessary because of the following reasons: the village in Aleppo was found to be situated in a rocky mountain where the size of plots were very small and scattered amongst the rocks. It was felt that the village was deviating too greatly from the normal pattern of farming. In Hassakeh, the villagers in that village refused to cooperate by pretending that they were landless and that the people who cultivate the village farms have left the country to work outside, after they have planted their fields. This could be possible, however, this did not cause a major problem since the existence of a neighbouring village was identified at a distance of less than 2 km. and situated on the same isohyet line. In addition, in Aleppo province, three farmers were replaced by an equivalent number after their selection for the interview. This was because two of them completely refused to be interviewed despite several unsuccessful attempts to persuade them to take part. One of them said "oh look my friend, I am not a type of farmer who deserves such an interview like this, I am not a proper farmer and the one you are looking for, go and see FOLAN he is the one. Whatever your objective is, you are not going to change my situation". It is understood that he is a poor farmer with a small farm size of not more than five hectares. The other one said "I hate farming and do not want to talk even one word about it, please find one who is interested". It was later understood that he was a big landlord and the application of land reform law and its modification has affected him several times. This in turn resulted in several cuts in the amount of land he had. This could be clear evidence for keeping him away from the interview and he was reluctant to give any piece of information which might lead, as he saw it, to more cuts in his property. So he pretended that he was not interested. The third farmer was found to have some mental problem, he was not able to understand even a simple question.

4.3.1 Local leader involvement in the process of selection

The majority, 70% of the sampled villages, were approached through the local leader "Mukhtar", 7% through the head of the cooperative and 23% through others.

4.3.1.1 Advantages of approach used

The involvement of the local leader, especially "Mukhtar", has a great value on speeding up the process of selecting farmers for interview. He could provide a list of names or help construct a new list. More importantly, the local leader plays a major role in making the selected members feel more relaxed and less reluctant in giving the required information. In the presence of the local leader farmers believe if something went wrong, then they at least have somebody on their side to share the responsibility. Also, farmers in front of others might be more reluctant to exaggerate things or deviate from telling the truth.

4.3.1.2 Disadvantages of approach used

Before starting the survey, it was planned to contact farmers at random wherever they were found in each village. i.e. the first two farmers to be met are the sample for the interview. This would not involve anybody in the process of selecting them, in order to pick up the real representative of the farming communities. By doing this, the fear of probability of bias by another person, such as the local leader not giving all the farmers names in the selected village is diminished. This latter situation might affect the selection of the real representative of farmers. However, all attempts to work by this method under the Syrian conditions failed. Several times the researcher tried to apply this strategy but most of time he was politely turned down and referred to the local leader first. This is not to say that the local leader under the Syrian conditions has an influential role upon farmers, (this could be possible for some particular farmers in a particular village), but this could be related to the fact that farmers were used to seeing that every official visit in the past was directed towards the local leader. They wondered why then this time it was directed towards them. Giving these circumstances, the involvement of the local leader became inevitable in this

process. This gives an indication that the involvement of local leader in the process of diffusing the future innovation might be valuable. However, Tully (1984) in his survey in Al-Bab in Aleppo-Syria, experiences the same conclusion. He said: "We (he and his assistant) always asked to speak to the Mukhtar, the head of cooperative or the village representative. If none of these were available we would speak with whomever we were directed to as being knowledgeable about the village".

In addition to the major disadvantage which is probably, as mentioned above, embodied in the prejudice of the local leader towards some particular farmer in his village, in the case of constructing new list, there is another disadvantage. It was laborious for the researcher, wasting some of his time and effort. This was due to the extra time which was spent in the identification of the location of local leader and the introduction of himself. However, it did enable the researcher to gain a greater insight into the village and its social order.

4.3.1.3 Overcoming the problem

In order to eliminate the fear of bias and its effect on the randomness of the selection, every possible opportunity to ensure the selection was "fair" was taken. For example, by double check list, i.e. by comparing the list obtained (Mukhtar list, head of cooperative list, or the villagers list, Fig. 4.2) with the list held by the village extension unit. Fortunately, a great similarity was found every time this comparison was made.

The village extension list might pose the following question: "since, a complete list of farmers already exists in a village extension unit, then why was it not used?" The simple answer for this is that not every village included in the sample was covered by an extension unit. This is due to the fact that the system has not been completed because it has only recently been introduced to Syria.

4.3.1.4 The final procedure

Two farmers in each of the thirty selected villages were randomly selected. As mentioned, a list of farmers names in a village was obtained from "mukhtar", (by his giving an already existing lists which he usually keeps, or, if he

did not keep such a list, he helped in the construction of a new one). Alternatively a list was obtained from the head of cooperative. In the latter case the head of the cooperative was asked to add to his list the non cooperative farmers. If no such records existed (as in the absence of both "mukhtar" and the head of cooperative), a list including all farmers in the village was constructed with the help of villagers. (see Fig 4.2)

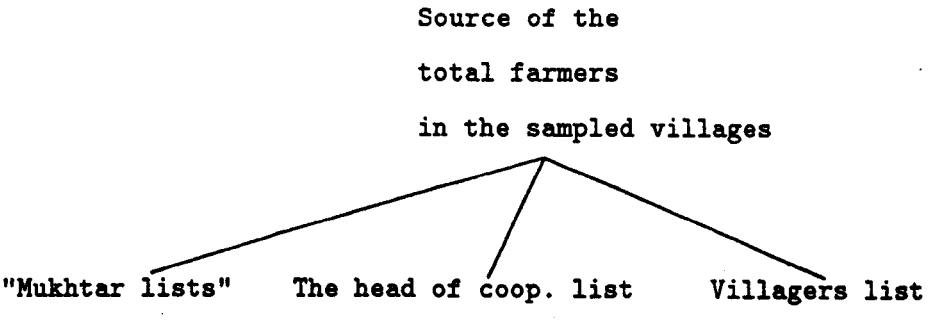


Fig 4.2

Having obtained a list through any of the three mentioned sources for every village, all farmer names on a list were recorded on small pieces of paper. Every piece was folded down and mixed with other pieces to form a pool , then somebody was requested to pull only two pieces out of the pool. The two names revealed on the two pulled pieces were the farmers in the village who were sampled for interview. (see Plate 4.1)

Each farmer included in the sample, was given a very long visit by the researcher with the guided assistance of a scheduled questionnaire which was prepared earlier. The interview started with an introduction by the researcher of himself followed by the explanation of the purposes of this interview. With every farmer the interview did not start until a cup of coffee or tea or sometimes food was eaten (see Plate 4.2). To a farmer, if a stranger takes the introduced drinks or food it is a sign that he or she is a friend and not an enemy. At no time was a farmer forced to sit down and answer questions until the sign of agreement initiated by him.

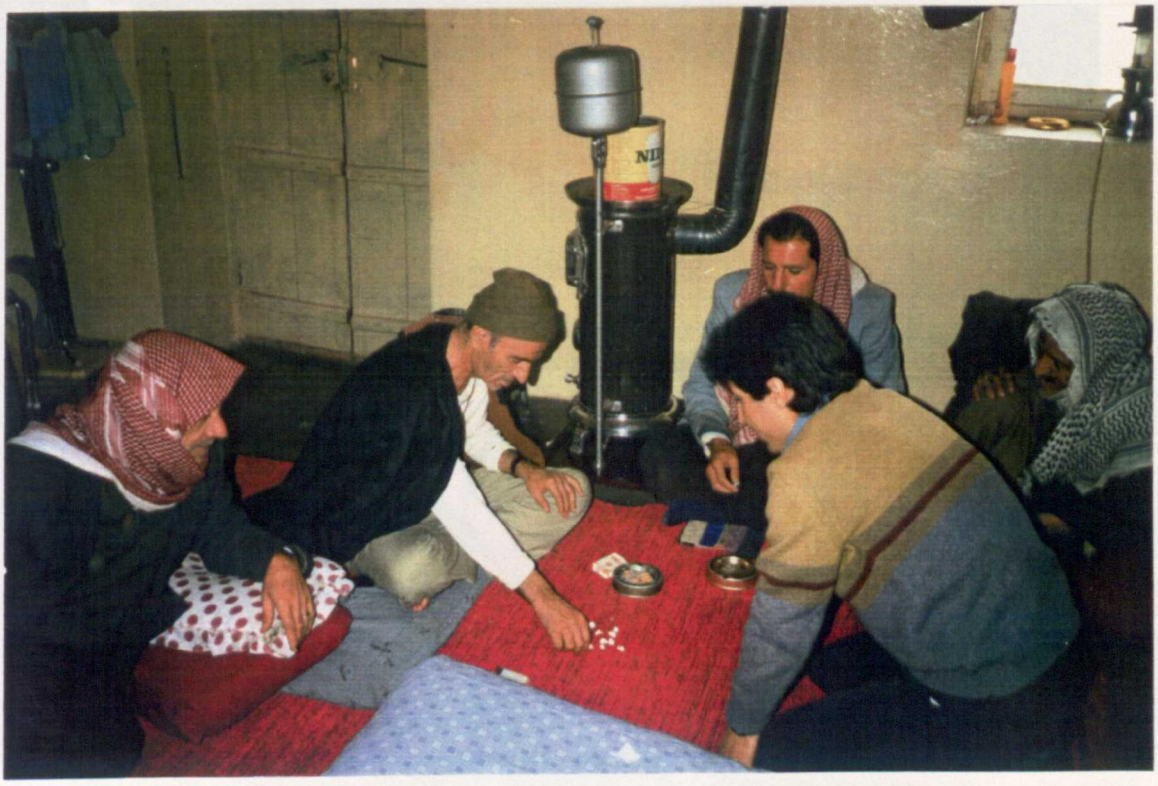


Plate 4.1 The process of selecting the sample

4.2 Farmers' hospitality

4.4 Measures of adoption

4.4.1 Practices

Nine improved agricultural practices and innovations were selected and the adoption behaviour of farmers to them was investigated. These practices and innovations were:

1. The use of nitrogen;
2. Adoption of the recommended time of nitrogen application. Unlike phosphorus, nitrogen can be lost easily from the soil. Therefore, if it is applied all at one time then a good amount of it can be lost.
3. The use of phosphate;
4. The use of improved varieties of wheat;
5. Adoption of the correct method of renewing seed wheat;
6. The use of herbicides;
7. The use of pesticides;
8. Adoption of the recommended method of seed bed preparation;
9. Adoption of sowing machine.

The adoption behaviour and extent of adoption of the nine selected practices were assessed in the interview.

4.5 Factors that might influence the level of adoption

Four major factors were carefully selected taking into consideration that they might be relevant to the Syrian farmers. They were considered, as they might be key issues for explaining the adoption behaviour of farmers particularly the rain-fed wheat farmers. These factors were: "personal and socio-economic", "psychological", "economic and institutional", and "communicational". These factors were measured in the following way.

4.5.1 Personal and socio-economic factors

Very little detailed information is available for Syrian farmers and thus some Personal and socio-economic data was necessary for the analysis of adoption.

4.5.1.1 Age

Age was stated by farmers in years. Age is possibly an important consideration in the adoption of new agricultural practice by farmers. Old farmers are sometimes more conservative to the new ideas than young farmers, therefore young farmers might more readily adopt new practices.

4.5.1.2 Farm size

The total area owned, rented or shared by a farmer was measured in "Donnom", (0.1 hectare). The majority of the respondents expressed their farm size by "Donnom", some by hectare and others by "Shwal", (estimated to equal one hectare).

Large farms usually are commercial where small ones are subsistence, therefore the larger farmer, encouraged by economic return, might adopt more and better innovations.

4.5.1.3 Fragmentation

Most Syrian farms are relatively small, holdings of less than 5 hectares constitute 56% of farmed land (AOAD, 1984). Therefore any cut or scattering in these sizes in particular might handicap the acceptance of new technologies. In Syria the property of farm land can be passed to children before or after the death of their parents. The distribution of the land after death corresponds with the Islamic law, but before, it depends on parents' attitude towards their children. Unfortunately, the inheritees (brothers and sisters) very seldom sell or buy their quotas of land from each other, and there is no law that can encourage them to do so.

4.5.1.4 Family size

Family size was measured by the total members in the family. It might include; husband, wife and children (in the case of nuclear family) or it might include husband, wives, children and grand children (in the case of the extended family). It is possibly that a family with a large number of children will adopt more new practices than a small one: first to meet the greater demand for food, shelter, clothes, education and other commodities, and secondly because it has cheap labour which may be important for the adoption of innovations.

4.5.1.5 Family type

Data on the type of family were collected, this could be:

- Nuclear, defined here as husband plus wife and children
- Extended, married and unmarried brothers and sisters living together under the guardianship of their father or eldest son in the same house or separately. All working together on the farm.

4.5.1.6 Level of literacy among farmers

Farmers were classified into three groups; illiterate, literate and educated. The objective test concerning the ability of reading and understanding the written material was achieved through asking farmers to read and summarize two to three sentences from a booklet which was issued by the extension service.

Usually farmers who are able to read can benefit from printed information related to agriculture therefore they might perform better in adopting innovations.

4.5.1.7 Level of education in the family

Each farmer was asked to state the education position of each member in his family. The scale which was used to weigh farmers position was as follows:

1. Illiterate persons were given a score of 0
2. Literate persons were given a score of 1
3. Educated persons were given a range of scores from 1 to 25. The score which each member can pick up from the range depended on which year he or she reached at school.
    - Primary school scores ranged from 1 to 6
    - Intermediate school scores ranged from 7 to 9
    - Secondary school scores ranged from 10 to 12
    - University scores ranged from 13 to 16
    - Further education scores ranged from 17 to 25

The level of education in a family was calculated by dividing the gross scores of education for its members by the family size minus the number of children under school age. This figure was used in the analysis.

$$LE = \frac{M}{FS - CH}$$

Where LE: Level of education, M: Total scores of education of member in a family, FS: Family Size, CH: Total Children under school age

This figure gives a good idea of the level of education in a family because it draws a line between members who are old enough for education and who are not. For example family X has 5 children A, B, C, D and E. A did not attend school while B and C did. B was found to be in the second year of Intermediate while, C was in the fifth year of the Primary school. D and E were still under school age while their parents were illiterate. The level of education of this family which were calculated by this equation was (7+5)/(7-2)=2.4. This level was very low if it is compared with a maximum number of this equation which is 25. This number would have been obtained by the family X if all its members reached the last stage in education ((25x7)/7=25).

Families with a high level of education are expected to be in a better position for adoption of new technologies. This could result from the demand to meet expenses of education on the one hand and on the other, the educated members in the family could play an important role in persuading their parents to adopt more new ideas by informing and explaining about the advantages of the latest technology.

4.5.1.8 Residency outside the village

Farmers exposure to aspects outside of their community is considered to be of great importance, where farmers may gain a lot of knowledge and learn what others do.

4.5.1.9 Years of farming

The years of experience in farming in general and wheat growing in particular were measured.

4.5.1.10 Wife involvement in the decision making process

Syrian women in the farming community share with their husbands the responsibility of carrying out farming work. There are some existing labour divisions amongst men and women e.g cleaning out chickens is "women's work". Women may want to be involved in the decision making process and so to take part in the discussion i.e. changes of method. For example, hand weeding is considered to be a women's responsibility, therefore the decision to adopt herbicide would benefit women in the first place by saving their effort and time, but this may not worry husbands. Using herbicides, which is "men's work", would move the responsibility of weed control to the men and this might lead to the rejection of herbicides by the men. However, if on a particular farm the woman was involved in the decision making process about this innovation, she may encourage her husband to adopt herbicides. If on another farm the woman was not involved then the man's wishes would prevail and adoption might not take place.

Three levels of wife involvement in agricultural decision making were identified. These levels were, "always", "sometimes" and "not involved at all".

4.5.1.11 Involvement of other family members in agricultural decision making

Farmers who did not involve their wives in the decision making process in agricultural affairs may share it with other members of their families, such as brothers or an aged mother who may have an equal say in the decision to be implemented. Similarly, farmers who involve their wives in the decision may share it with other members of their families as well. They may also have an equal say in the decision to be implemented.

Three groups of decision making in agriculture were identified; "farmer himself", "farmer and his wife or brother or mother", and the "whole family". It is possible that the wiser decision could result from the involvement of more people. This in turn might lead to better adoption behaviour. This is against the popular proverb which says "the meal with more than one cook usually burns".

4.5.2 Psychological Factors

Non economic factors among farmers are important and should be considered by people who are concerned with change, particularly "extensionists". There is little chance for new things to be diffused and adopted if they contradict with the culture of farmers. Therefore, the identification of these non economic factors are of great importance for designing and modifying the "extension" packages of recommendations. Examples of positive and negative factors in culture are well explained by Smock (1969) and Ongkili and Quikly (1983). In this research in Syria aspects such as farmers' attitudes, their belief, their Self-images and their use of agricultural proverbs were assessed. These were a wide range of aspects designed to gain an understanding of their feelings and beliefs. Some of these factors were indirectly measured in terms of agreement or otherwise with statements and structures. This approach as far as is known, had never been used before in Syria and it was likely that the data generated would reveal important factors aiding the understanding of Syrian farmers.

4.5.2.1 Farmer attitude

".....every thing in life depends on people's attitude; be that as it may, attitudes are so important in fields like politics, marriage, religion, food habits, social change, education, fashion, childrearing, racial prejudice, communication, and many others,...." (Oppenheim 1966). This quote illustrates the importance of farmers attitude towards various aspects of life.

Each farmer was asked to state the degree to which he liked or disliked the following jobs:

1. Rain-fed cultivation
2. Irrigated cultivation
3. Animal and poultry raising
4. Machinery
5. Trade
6. Government employment

7. Other self employment

For each of the seven mentioned jobs, farmers were split into five different groups according to answers they have given. Their answers would be : "like very much", "like", "neutral", "dislike", or "dislike very much". Each farmer was also asked to preferentially rank the seven careers. The analysis score was the position he gave to rain-fed cultivation. In other words, the higher the position the farmer has given the better attitude towards rain-fed agriculture he has.

4.5.2.2 The measurement of beliefs

The decision to take up innovations might be affected by the farmer's belief such as the value placed on hard work and family glorification, the strength of tradition, etc.. These beliefs could help or prevent farmers from adopting new ideas.

There were nine different statements under this title, (see the questionnaire Appendix G). For each one, farmers were asked to express their opinion by saying: "agree", "agree in part" or "disagree". Therefore, farmers were split into three groups each time for each statement.

However, during the pre-testing some of the nine statements have raised some difficulties in extracting the right answers from farmers. It was therefore realized that these statements need more attention. For example, the following story was recited for each farmer in order to extract the answer for the first statement (i.e. glorifying a family future). The story was about a very old man who was planting a palm tree. He was almost sure that he would not be able to harvest its fruit. Suddenly someone passing beside him, stopped and said: "oh old man, the tree you are planting will not give fruit within a short period of time and you are old and you may die before harvesting its fruits". The old man replied: " look man, do not forget that our fathers planted for us to eat. We are planting for our children to eat too".

The statement about "some demeaning practices" was asked with the following examples which all were taken from the culture of the society. These were "milking the cow", "cleaning the house", "cleaning the animal

shed and coop", and "pulling weeds". All these actions were considered traditionally to be women's jobs.

For the statement about "glorifying the traditional life" farmers were asked to present a little comparison between his life and his father's life.

The statement about "superstition" was presented in a form of fiction which was obtained from the culture.

Lastly, the statement about "omens" was asked by reciting the following well known examples:

- A sign of seeing owl in the building. The owl usually lives in a ruined building. Therefore, when it is seen standing on a new house, it is an indication that the house is going to be destroyed.
- A sign of abnormal twinkling of eye. It is a sign of bad or good thing that is going to take place.

4.5.2.3 The measurement of Self-Concept

"A common explanation put forward for the failure of the uptake of research findings, or innovations, is considered to be a lack of knowledge by the farmer of these new techniques. Many resources are committed to information transfer. However, it may not be lack of knowledge which inhibits adoption but a conflict created by the new idea with the image of the self". (Seabrook and Higgins 1988).

The three components of the self concept (see Chapter 3) i.e. "Cognized Self", "Other Self", and "Ideal Self"; were tested for each farmer for seven different dimensions (Fig 4.3). In relation to each dimension, a farmer was asked to report first on how he perceived himself, second how he thought that others saw him and third how he wanted to be seen. The scale which was devised by Seabrook and Higgins (1988) to measure the United Kingdom farmers' Self-Concept was applied to the Syrian farmers with some modification. Some dimensions were taken out and others added in order to fit Syrian farmers. Furthermore, the length of the scale was also extended one segment more to form five equal divisions where the segment in the middle is allocated for farmers whose perception was in between.

Progressive	-----5-----4-----3-----2-----1	Traditional
Efficient	-----5-----4-----3-----2-----1	Inefficient
Innovative	-----5-----4-----3-----2-----1	Not innovative
Proper	-----5-----4-----3-----2-----1	Not proper
Experienced	-----5-----4-----3-----2-----1	Inexperienced
Trust others	-----5-----4-----3-----2-----1	Do not trust others
Fortunate	-----5-----4-----3-----2-----1	Unfortunate

(Fig 4.3) The Scale Of The Self Concept

The definition of the words, used as dimensions, as perceived by farmers (i.e these words were defined by farmers during the pre-testing of the questionnaire) were as follows:

- Progressive farmer: is a notable person in the way he handles farming, probably rich with some extra land, always in front of others in taking on new ideas.
- Efficient farmer: is a type of person who looks to details, keeps records and uses or treats things in an economic way.
- Innovative: having the ability to tackle problems patiently with self determination by using several ways to solve them, is innovative, and takes risk.
- Proper: ideal or perfect farmers i.e have all the characteristics of the progressive, innovative and efficient farmers together.
- Experienced: not defined by years spent in farming but by having had the opportunity and taken the opportunity to learn.
- Trustful: the degree to which farmers trust others
- Fortunate farmer: A fortunate farmer is the lucky one.

4.5.2.4 The measurement of the use of Agricultural proverbs

The indigenous knowledge of farmers could be of great value for research and extension together. They might correspond with the recommendation and they might not.

Here are some examples of reported farming proverbs; "plants which are exposed to October star are yielding twenty times more", "exchange your seed even with your neighbour", "the weather in March decides all".

Alternative answers concerned with the degree of following these proverbs were obtained

1. "Knowing some phrases"- Farmers who know some phrases have been put in one group, and those who do not have been put in another group.

2. "Believe in them"- Again, farmers who knew some phrases were divided into three groups according to their belief in them. These groups were: "completely believe in them", "to some extent believe in them" and "little belief in them".

3. "Application in farming"- Farmers were also divided into four groups according to the frequency of application of the known phrases ("always", "sometimes", "rarely", and "not using them").

4.5.2.5 The measuring of the reaction to defeat in agricultural arguments with another farmer

This statement may measure farmers willingness to learn, exchange ideas and change. In the interview, each farmer was asked to report on how he felt if he found out that the other partner knows better than him about farming. In order to measure this, the following statements were given:

1. "increase the status of the other person from your point of view"

2. "blame yourself"

3. "wish to be like him"

4. "do not care".

Each of the first three statements was given a score of 1, and a 0 was given for the last statement.

4.5.2.6 The farmers view of being the first to adopt agricultural innovation

The objective of this statement is first to measure how valuable the moral reward by the society was perceived by an individual if he gets a new thing first. For example, some individual may spend a lot of money towards something which may be worth nothing. He may do this just in order to get people to talk about him.

This statement is also an enforcement of the statement about "risk taking" (see the Questionnaire, Appendix G).

The higher the value of the reward was perceived by the individual the higher the possibility of taking up the innovations.

A scale with a dimension of three points was used in order to measure farmer's perception of that value "moral reward", (Fig. 4.4).

```
----------1----------2----------3
Not proud of it       Normal       proud of it
```

(Fig. 4.4) The scale of perception of moral reward.

4.5.2.7 The measurement of the farmers reaction to news

Like other people, farmers differ in the way they behave towards news. Some are very keen to hear and to ask more and some could not care less. Farmers who react quickly to news and seek more details of it may have more quantitative and qualitative information. Therefore, it is possible that farmers who have these characteristics are going to adopt quickly.

If a farmer responded to any news by searching for details about it, then a score of 2 was given. If he wanted to know little he was given 1 and he was given a score of 0 if he did not respond at all.

4.5.3 Economic and Institutional Factors

Syria is aiming to produce and manufacture locally the agricultural products needed for development and producing them to surplus in the local market.

Priority was given to producing and manufacturing fertilizers, seeds, and machinery. Despite some progress which has been achieved in that respect, Syria is still dependent on importing a great deal of agricultural products. This sometime creates shortages in the availability of inputs in the local market.

In order to ensure equity in distributing the inputs among farmers, farmers were asked by the Government to follow certain types of routine which makes the access to these inputs less easy especially for small individual farmers who are out of the cooperative service.

4.5.3.1 Access to Credit

Credit here refers to cash and kind. This is restricted to credit for buying inputs or hiring machinery in order to facilitate the adoption of the nine selected innovations and improved practices by farmers, who did not have the cash available.

Farmers were asked to state their feelings about the accessibility of obtaining credit if their own cash was not available. Of course a farmer who obtained credit from somewhere else would report his feeling, about the access to the credit, which is built on his experiences. But a farmer who did not get credit would report his feeling which is built on his perception. This perception might come from the farmer's experiences, i.e. he might have asked for credit but he could not get it, or it comes from the experience of other farmers who convey the message about the access to credit to him, or it could be related to his own experience with another matter such as getting a loan for buying personal things.

Scores of 3, 2, and 1 were respectively given for "easy", "medium", and "difficult" access respectively.

However, the level of difficulties were left to farmers' assessments or perception (as it will be in the other sections of these economic and institutional factors). Although the ease to access was inferred from time and effort spent by the farmer, there was no specific count for time or effort i.e farmers have not been asked to tell how many hours or how many times they had to go in order to get a loan. This was because all the farmers who have been interviewed during the pre-testing were found not to be able to count time

and effort not just regarding the access to credit but to other aspects as well.

4.5.3.2 Inputs

The inputs considered were; fertilizer, new wheat seeds, herbicides, pesticides, spray equipment, transport, tractors and sowing machines.

1. Access

   Farmers were asked to state the level of difficulty that they have faced in getting fertilizers, wheat seeds, herbicides, pesticides, tractors, and sowing machines etc. If some farmers have not dealt with any, then they were asked to report their opinion based on the experience of others, or built on their own experience relating to a particular input that they also obtain. Again, there was no specific measurement to the level of difficulty that farmers faced in getting these inputs. It is left to the farmers assessment.(see section 4.5.3.1).

   A score of 3, 2 and 1 was given to "easy", "medium" and "difficult" statements reported about each access.

2. Cost

   Here is meant the cost of hiring or buying the mentioned inputs. Also the level of cost ("expensive", or "cheap") were left to farmers' assessments.

   Scores of 1, 2, and 3 were given respectively to "expensive", "normal", and "low cost".

4.5.3.3 Output

1. Price of wheat

   Each farmer was asked to report on the price of wheat. A score of 3, 2, and 1 was given to a statement of "good", "fair", and "low price" respectively.

2. Place

   Defined as the market, where the product can be sold. If it was "easy" for a farmer to find a market, then a score of 3 was given. A score of

2 and 1 were given if he has faced "some" and "a lot" of difficulties respectively. Farmers who did not sell their products were asked to express their opinion based on the experiences of others, or their own experience related to other matters.

3. Farm road conditions

   This was observed by the researcher and reported by farmers as well. A score of 3, 2, and 1 were given for "good", "medium" and "bad" road condition respectively.

4.5.3.4 Access to Extension

Each farmer was asked to report the level of difficulties that he has faced in contacting the Extension organisation. If he did not make such contact, then he was asked to express his opinion on others' experience. A score of 3, 2 and 1 was given to "easy" "medium" and "difficult" contact with "Extension" respectively.

4.5.3.5 Wheat as a cash crop

The economic return could encourage farmers to adopt more related innovation in order to maximize the return. All the selected farmers were found to be growing wheat. If wheat was the main cash crop for the farmer then a score of 2 was given. A score of 1 was given if it was not.

4.5.3.6 Land tenure

The up take of innovations could be affected by; the position and possession of land, availability of existing resources at a farm and by economic issues.

Under the Syrian condition, where several land relationships exist, the degree of land ownership (from Mulk, to Islah, to Ikta) by the farmer might be of importance. The uptake of innovation could be affected by that degree of land possession.

According to the replies of farmers on the land tenure, different types of land relationships were identified. These were:

1. Owned land with one owner, "MULK"- This land is registered in the name of the owner. This is the ideal type of land relationships. The

land owner can do whatever he likes to do with it. He can sell it, let, or pass it to others. All the land income is for the land owner only.

2. Inherited land, "WORTHEH", or, owned land with more than one owner. This results from the distribution by law of the land of a deceased person among his inheritors. This type of land might be served as one unit by the inheritees. They share labour, inputs and outputs (all the studied farmers who have this type of land tenure were doing the same, i.e. serving their farms as one unit). The legal possession of land is still in the deceased person's name.

3. Reform land, "ISLAH". Originally, it came from the action of the Government on cutting the size of large farms and redistributing it amongst landless individuals. The agrarian reform law allows this category of farmer to possess this land after twenty years of continuous farming by them. This period of time gives a chance for them to pay back only a quarter cost of the land to the Government (Ministry of Agriculture and Agrarian Reform 1983).

4. Feudal land, "IKTA". The property of land belongs to the liege lord. The farmer who occupies this land over a long period is responsible for providing input and labour. The output is divided by a quarter and three quarters among the liege lord and the farmer respectively.

5. Rented land. The renter in this case signs a deal with the owner to pay him a sum of money in exchange for land. Input, output and labour are all provided by the renter.

6. Shared land: The land owner and the farmer who cultivate the land are sharing the input and the output equally. The labour is provided by the farmer.

4.5.3.7 Soil type

Three levels of soil type were assessed. These were "good", "medium" and "poor". The "good" soil type was defined to farmers as a deep soil (about 50 cm. and over) with no stones. The "poor" soil was defined as a shallow and may be mixed with small stones. The "medium" type falls in between.

4.5.3.8 Farm type

This is a measure of the cropping policy, whether the farm is purely concentrated on field crops (rain-fed), partly irrigated or occupied by fruit trees. The two types ("rain-fed only" or "rain-fed and irrigated") of farming were considered in the analysis. It is possible that farmers who have devoted some parts of their farms to be occupied by irrigated crops or trees are going to be in a better economic position, which in turn might help in financing the rain-fed innovations. A score of 1 was given to "pure rain-fed" farming and score 2 for "rainfed and irrigated farm".

4.5.3.9 Farm owned equipment and machinery

Farmers were found not to be reluctant in giving information about their equipment or machinery. This might be because of the following: first, farmers consider these properties as a source of prestige and wealth so they were proud to tell about them, second, farmers were not afraid of tax payment because they had already paid it on these machines.

Equipment and machinery means, tractors, small lorry, trailer, all tillage equipment such as discplough, duckfoot cultivator, etc., all types of sowing machines such as drill, spacer etc., all types of herbicide and pesticide sprayers (except manual), combines, and other harvesters.

Each equipment or machine unit has a score of 1. So, the higher the cumulative score for the farm, the better it was equipped and mechanized.

4.5.3.10 Livestock

Unlike the giving of information about equipment and machinery, most farmers were found to be reluctant to give information about their livestock especially sheep. This is was due to the fear of tax. Farmer properties regarded as livestock were not registered or well known to the Government. Therefore, a farmer can tell whatever he likes about his livestock.

The questioning about livestock was restricted to sheep and cattle. The total number was transformed into animal units owned by each farmer. According to Spedding (1981), the animal unit for an ewe and a cow is 0.1 and 0.8 respectively. Although this measurement is based on the live-weight, it is comparable in terms of value to the livestock market in Syria.

4.5.3.11 Labour

This refers to the source of farm labour. However, according to farmer answers, different levels of labour dependency among them have emerged. These were:

1. 'Family labour', dependent on the family completely, (score 5)
2. 'Family and outside labour', dependency on 'family labour' was greater (score 4)
3. 'Family and outside labour', dependency on 'family' and 'out side labour' was equal (score 3)
4. 'Family and outside labour', dependency on 'family labour' was less, (score 2)
5. 'Outside labour', dependent on 'outside labour' completely, (score 1)

4.5.4 Communicational Factors

The level of knowledge about innovations can be obtained through different types of communications; personal (face-to face), mass media, and a combination of both personal and mass media. Personal communication is considered to be relatively more important at the persuasion stage of the adoption of innovations while mass media is considered to be relatively more important at the awareness stage. Also, early adopters benefit more from mass media than late adopters. Whatever the implication of the theory is, the level of knowledge about the innovation could affect the adoption behaviour of farmers.

4.5.4.1 Source of information

Each farmer was asked to count and rank sources such as Extension agent, mass media etc., utilized for obtaining useful information about the agricultural practices or innovations. Each source mentioned by a farmer was given a score of 1. It is possible that farmers who have benefited from several sources of information are going to be in a better position in adopting new behaviour.

4.5.4.2 Extension

The level of awareness by farmers about the Extension service was asked for. This has been achieved through the following:

1. "Hearing of it". A score of 1 for a farmer who "heard of it" and 0 for one "who has not".

2. "Definition of the objective", i.e. for what purposes the Extension was established . Scores 2, 1, and 0 were respectively given to the following answers: "can define it well"; "can define it to some extent"; and "can not define it".

4.5.4.3 Change agent

Several questions about the change agent were asked. Some of these were concerned with the level of mutual contact between the change agent and farmers. These were:

1. "The existence of a change agent in the village". A line was drawn between farmers who have a change agent in their home village and those who have not.

2. "Farmer paying visit to the change agent". Each farmer was asked to state how often he has visited change agent at his office. If he has:

   - "no contact at all" (score 0)
   - "rare contact" (score 1)
   - "sometimes contact" (score 2)
   - "always contact" (score 3)

3. "Change agent paying visit to farmer": This was scored in the same way to "farmers paying visit to change agent". Considering (4.5.4.2) and (4.5.4.3), the higher the scores the farmer has got , the more contact with extension he made. It is possibly that farmers with more contact are adopting more innovations.

4. "Judgement": Farmers, who had contacted extension workers or had been visited by them were asked to state the degree to which this

contact had helped them to make their decision in order to adopt new technologies or innovations.

4.5.4.4 Cooperative

1. Visit and meeting

   Contacting the cooperative is considered to be of great importance where farmers can meet and exchange ideas as well as to obtaining new ideas. Although the main task of the cooperative is to provide inputs and facilitate the selling of outputs, it is also considered to be a source of new information. Given these circumstances, it is possible that the more contact the farmer has made to the cooperative the more he is likely to adopt innovations.

   Frequency of contact with cooperative (general visit and meeting attendance) ranging from "always" to "never" contact were recorded and scored. A range of scores from 0 to 4 were given. The highest (4) was given to "always contact" and the lowest (0) to "never contact".

2. Judgement

   This was discussed in previous section (4.5.4.3).

4.5.4.5 Extension unit at the village level

The existence and the date of establishment of the unit at the village of sampled farmers were recorded and analysed.

4.5.4.6 Agricultural Extension plot

Hearing, seeing and doing things by farmers might be the best way for them to be persuaded and adopt new ideas.

1. Involvement

   Each farmer was asked to state the level of involvement in Extension plots. Each level was scored as follows:

   - "involved by applying it" (score 3);
   - "just visited it" (score 2);
   - "just heard of it" (score 1);

- "not aware of it" (score 0).

The higher the level of the involvement by a farmer the more likely he might be to adopt more innovations.

2. Judgement

As discussed in section (4.5.4.3).

4.5.4.7 Television

Syrian television, which is state owned, shows different agricultural activities through an Agricultural Extension programme (Our Green Land) and advertisements (spots). The programme is broadcast weekly, while spots are broadcast more than once a week after or between some particular television programmes.

Television as one of the mass media components has the capability of playing an important role in making farmers aware of innovations at the early stage in adoption. It is possible that farmers who were more exposed to television are likely to adopt more innovations.

1. Watching television

Frequency of watching television (Extension programme and agricultural spots) ranging from "always" to "never watched" were recorded and scored. A range of score from 0 to 4 was given. The highest 4 was given to "always watch" and 0 to "never watch".

2. Judgement of television. This was carried out as explained in section (4.5.4.3).

4.5.4.8 Radio

Syrian radio, like Syrian television, is also contributing to the agricultural development by broadcasting different agricultural activities through the Extension programme "Our Good Nature land" (formerly, "Farmer Voice"). It is broadcast daily through the public service radio. It is supervised by the Ministry of Agriculture Department of Extension with the coordination of Peasant Union and radio technicians (Manzardo, 1980). In 1982

the programme, for example dealt with 288 different agricultural subjects. (Ministry of Agriculture, 1982).

Radio compared to television is very cheap and expected to be in every Syrian household. As a communication channel, it might influence farmers adoption behaviour by making them aware of new things especially in the early stages of adoption.

1. Listening to radio and to its agricultural programme

   The habit of listening to radio in general and to its agricultural programme ranging from "always" to "never listen" were considered and recorded. A range of scores from 0 to 4 were given. The highest, 4, was given to "always listening" and the lowest, 0, to "never listen".

2. Judgement of the programme and radio in general. This was done as discussed in section (4.5.4.3).

4.5.4.9 Agricultural publications

Agricultural publications comprise leaflets, booklets newspapers and magazines. Unlike radio and television, publications require people to be able to read in order to benefit from their information. In Syria, some of the publications are supervised by the Extension service and some by the Peasant Union. Publications as a source of new information about agriculture could influence the adoption behaviour of their readers.

1. Reading:

   Frequency of reading the publications by farmers ranging from "always" to "never read" were recorded and scored. A range of score from 4 to 0 were given. The highest, 4, was given to farmers who "read always" and the lowest, 0, for who "never read".

2. Judgement. This was done as explained in section (4.5.4.3).

4.5.4.10 Neighbour

Dialogue among farmers is considered to be of great importance for exchanging agricultural information. Therefore, it is possible that farmers who have better relations with neighbours and frequently discuss agricultural affairs

with them are going to be influenced by what they are doing in general and particularly in agriculture.

Frequency of visiting and discussing farming with neighbours ranging from "always" to "never" were recorded and scored. A range of scores from 0 to 4 were given. The highest, 4, was given to farmers who "always visit and discuss" agricultural affairs with neighbours and the lowest, 0, who "did not".

4.5.4.11 Other sources for agricultural information

These include agricultural film shows, study tours, field days and farmer training.

1. Awareness and involvement

   Farmers were asked about the awareness of the five mentioned sources and the date of the first hearing about each of them. Farmers involvement and number of times that they have been involved in each of them were recorded and later analysed.

2. Judgement. This was carried out as described in section (4.5.4.3)

4.5.4.12 Selection of the communication method

The thirteen mentioned methods (Change agent, Cooperative , Field plot, Television programme, Television advertisement, Radio, Publications, Neighbour or leadership, Film show, Study tour, Field day, Training and Self contact, (i.e the farmer himself will go to Extension), which were discussed with farmers in more detail, were again recited to them in the above sequence. Farmers were then asked to select and rank the communication channels that they consider as the most important one for transmitting information and helping them to adopt a new practice or innovation.

4.5.5 Summary

A sample of 60 farmers was randomly selected. Four major factors were chosen, and objective data collected. These factors were "personal and socio-economic", "psychological", "economic and institutional", and "communicational".

A full attempt was made to generate "scores" and "measurements" for each of the factors. The limitations of this approach are recognised but without such scoring of sometimes subjective assessing it was unlikely that the major influences could be identified. This is a prime objective of this research.

Nine improved agricultural practices and innovations were chosen and the adoption behaviours of farmers to them were investigated.

The data collected are analysed in the following chapters. Personal and socio-economic factors are considered first; after a study of the characteristics of the farmers, Chapter 5.

CHAPTER 5

Classification of the farmers on their level of adoption

5.1 INTRODUCTION

The foregoing chapter outlined the investigated factors which were likely to influence adoption. In this chapter, the adoption behaviour of farmers will be constructed and scored. The construction will be built on the level of uptake of some improved practices and innovations related to rain-fed wheat farming. Before doing this, however, it is felt that it is necessary to give a general background about the improved practices and innovations as well as to the implication of their uptake by farmers.

So, the aim of this chapter is to investigate some farmer practices for rain-fed wheat farming. This, as a consequence, will help in building up the adoption variable which will be used in the later analysis.

5.2 The wheat practices

5.2.1 Nitrogen

More than half of the farmers, 52.5%, in Zone1 started using nitrogen during the 1970s while only 12.5% started before 1970, 22.5% during the 1980s and 12.5% have not started yet. In Zone2, 40% the farmers started using nitrogen after 1980, only 10% started before 1980 and 50% have not started yet, Table 5.7. This difference in the time of adoption of nitrogen between Zone1 and Zone2 could mainly be due to the differences in the time of releasing this innovation in each zone. In other words, this innovation was made available to farmers in Zone1 before Zone2.

However, despite the fact that nitrogen was introduced to farmers a long time ago (before 1970) its adoption did not become clear until the 1970s. This could be related to the introduction of improved varieties of wheat

which responded better than local varieties to the application of nitrogen.

None of the farmers in Zone1 rejected nitrogen after adoption, whereas in Zone2, the percentage of farmers who rejected nitrogen after adoption was 20%. Meanwhile, 10% of the farmers who have adopted nitrogen, in Zone1, have sometimes ceased its adoption and then started again. In Zone2 the percentage of farmers who have in some seasons ceased to use nitrogen has reached 15%, Table 5.8.

5.2.2 Phosphorous

The percentage of farmers who started using phosphorous during the 1980s in Zone1 was found to be 35%, 37.5% during the 1970s, 10% before 1970 and 17.5% have not started yet. In Zone2, 35% started using phosphorous during the 1980s, 5% before 1980 and 60% have not started yet, Table 5.7.

In both zones, the adoption rate and the percentage of farmers who adopted phosphorous, Tables 5.7, 5.8 and 5.9, were found to be less than those for nitrogen. This could be related to the attributes of these two innovations and the awareness of farmers. Farmers can recognize the response of their plants after a short period of applying nitrogen while the application of phosphorous cannot be seen rapidly because it is mostly used to form the grain. This finding agrees with Rassam and Tully (1985) when they carried out a survey on wheat farmers in Syria (Aleppo, Idlib, Hama, and Homs). They found that 38% of the sampled famers did not use phosphorous compared to only 7% for nitrogen.

None of the farmers, in Zone1, have rejected phosphorous after adoption, whereas in Zone2, 15% of farmers who adopted phosphorous rejected it. Also, 10% of the farmers who have adopted phosphorous in Zone1 have ceased its adoption in certain seasons, this percentage in Zone2 was 5%, Tables 5.8 and 5.9.

5.2.3 Time of applying Nitrogen

Only 12.5% of the famers in Zone1 started using nitrogen at planting time, the Extension and research recommendation, during the 1970s, 37% during the the 1980s and 50% have not started yet. In comparison, all those farmers, (20%), who started using nitrogen at planting time in Zone2 started during

the 1980s while 80% have not started yet, Table 5.7.

This delay in adopting this recommendation by farmers could be related to the recent release of this recommendation to farmers. In the past farmers used to have mixed fertilizers, phosphorous and nitrogen, to apply at planting time while now nitrogen and phosphorous are supplied to farmers as separate inputs.

None of the farmers in Zone1 rejected or ceased the recommended time of nitrogen application while in Zone2, 5% of farmers have rejected it after adoption.

5.2.4 A wider consideration of chemical fertilizers

The percentage of farmers who have never used any chemical fertilizers, Nitrogen or Phosphorous, in Zone1 was 12.5% while in Zone2 this percentage was higher, 45%, Table 5.1.

When farmers who never tried fertilizer, were asked about the possibility of using chemical fertilizer in the future, just one farmer, from Zone2, said: "it is not possible", the rest (13 farmers) said "it is possible". The reasons given by that farmer for not applying any chemical fertilizers in the future was that first, he did not believe in them, and second he says, "the land does not need fertilizer because it is too fertile". This negative attitude towards chemical fertilizers might have resulted from the fact that he was not aware of the importance of chemical fertilizer, his young age and the little experience he had in farming might support that view. This also might give an indication that this innovation might not be relevant to his soil.

The thirteen farmers who said they would adopt can be split into two groups when they were asked to state approximately the year of likely adoption in future. Farmers in the first group, consisting of 5 farmers, said: "no exact year, we are waiting for some other farmers in our village to take the initiative". Farmers in the second group, consisting of 8 farmers, said: "when the capital was available". The second group of farmers were asked again the following question: "If the chemical fertilizer was introduced to you with credit and you do not need to pay back a penny until harvest time, will you use chemical fertilizers?". Just two said "no" and the rest said "yes". It could be concluded that the lack of capital by these farmers was not the only reason for not taking up this innovation, it was also uncer-

tainty and risk aversion which will be discussed in the following chapters. Appendix D also considers reasons that have been given by farmers for not using the chemical fertilizers in the past.

The amount of nitrogen and phosphorous that has been used by farmers, in both zones, varied considerably from one farmer to another, Figs 5.1, 5.2, and 5.3. However, the average amounts of nitrogen and phosphorous which were applied by farmers on local and improved varieties of wheat, in both zones, were found to be lower than the rate recommended by the Extension service, Table 5.2. In order to find out the deviation in application rates of nitrogen and phosphorous from that recommended by the Extension service, the "t" test was applied. The results of the "t" test are displayed in Table 5.2. Most of the significant results were found to be in Zone1 and associated with the use of improved varieties of wheat.

In order to see whether the significant results in Table 5.2 have been caused by the lack of awareness of the recommended rates by farmers or whether farmers perceived the recommendations themselves as inadequate, a further "t" test was carried out. To achieve this farmers were split into two groups each time, ("Extension contacting farmers" and "non Extension contacting farmers"), Table 5.3.

It can be concluded from Table 5.3 that "Extension contacting farmers" were found to be closer to the recommendation for the rate of nitrogen and phosphorous than "non contacting farmers", although the results of this test did not always show a significant relationship. This might suggest that the considerable variabilities in the rate of nitrogen and phosphorous among farmers were likely to be caused by the lack of awareness of these rates by farmers. This would emphasize the importance of the knowledge of the innovation which will be discussed in more detail in Chapter 8.

Different sources for learning about chemical fertilizers have been identified in the survey. These were the "Agricultural Bank", "Extension service", "neighbour", the "Cooperative", "ancestors" and "traders". The major sources for learning about fertilizers in Zone1 were found to be "neighbours" (37%), followed by the "Extension service" (18%). Other sources were "traders" (17%), the "Cooperative" (11%), "Agricultural Bank" (9%),

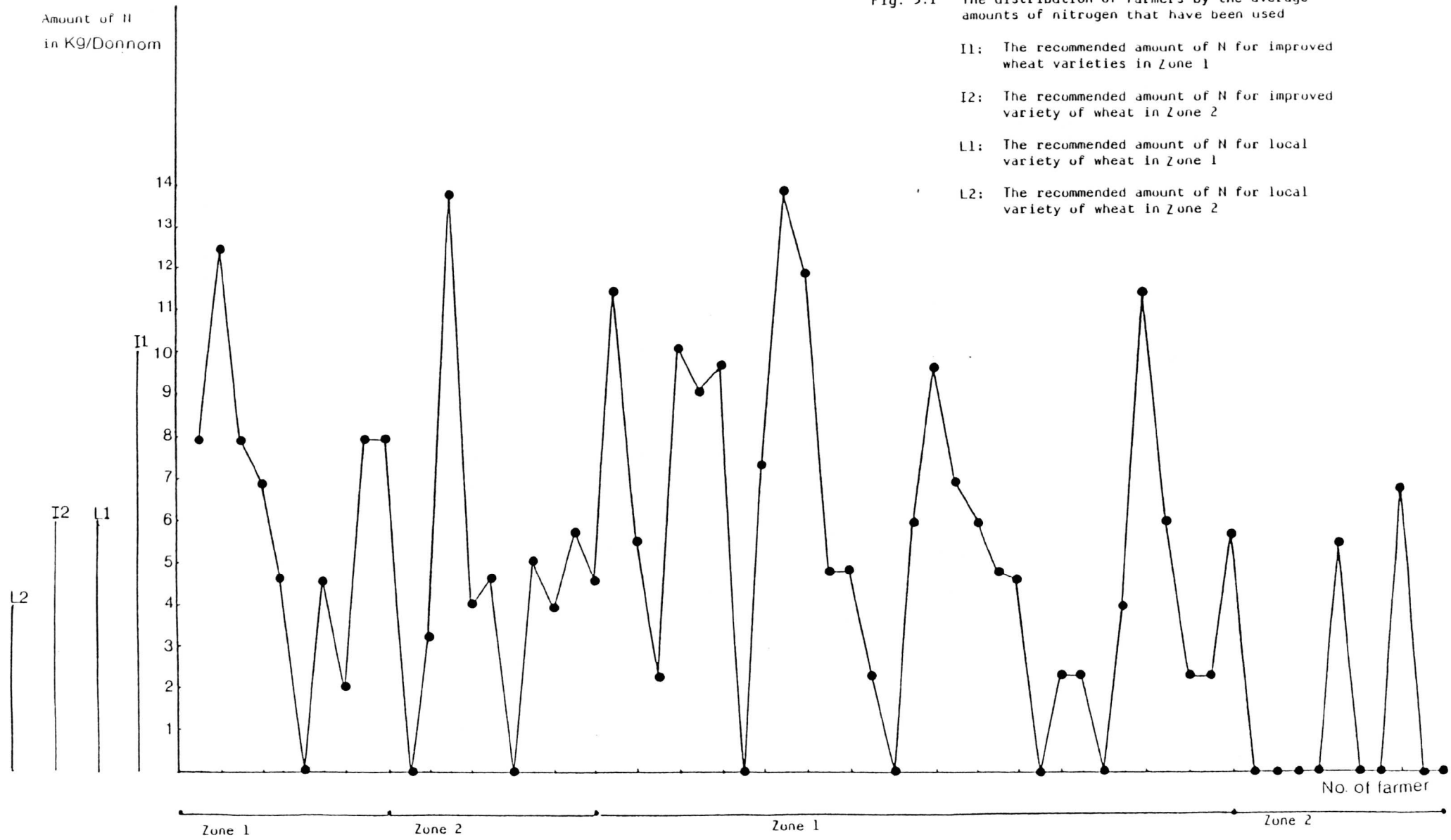


Fig. 5.1 The distribution of farmers by the average amounts of nitrogen that have been used

I1: The recommended amount of N for improved wheat varieties in Zone 1

I2: The recommended amount of N for improved variety of wheat in Zone 2

L1: The recommended amount of N for local variety of wheat in Zone 1

L2: The recommended amount of N for local variety of wheat in Zone 2

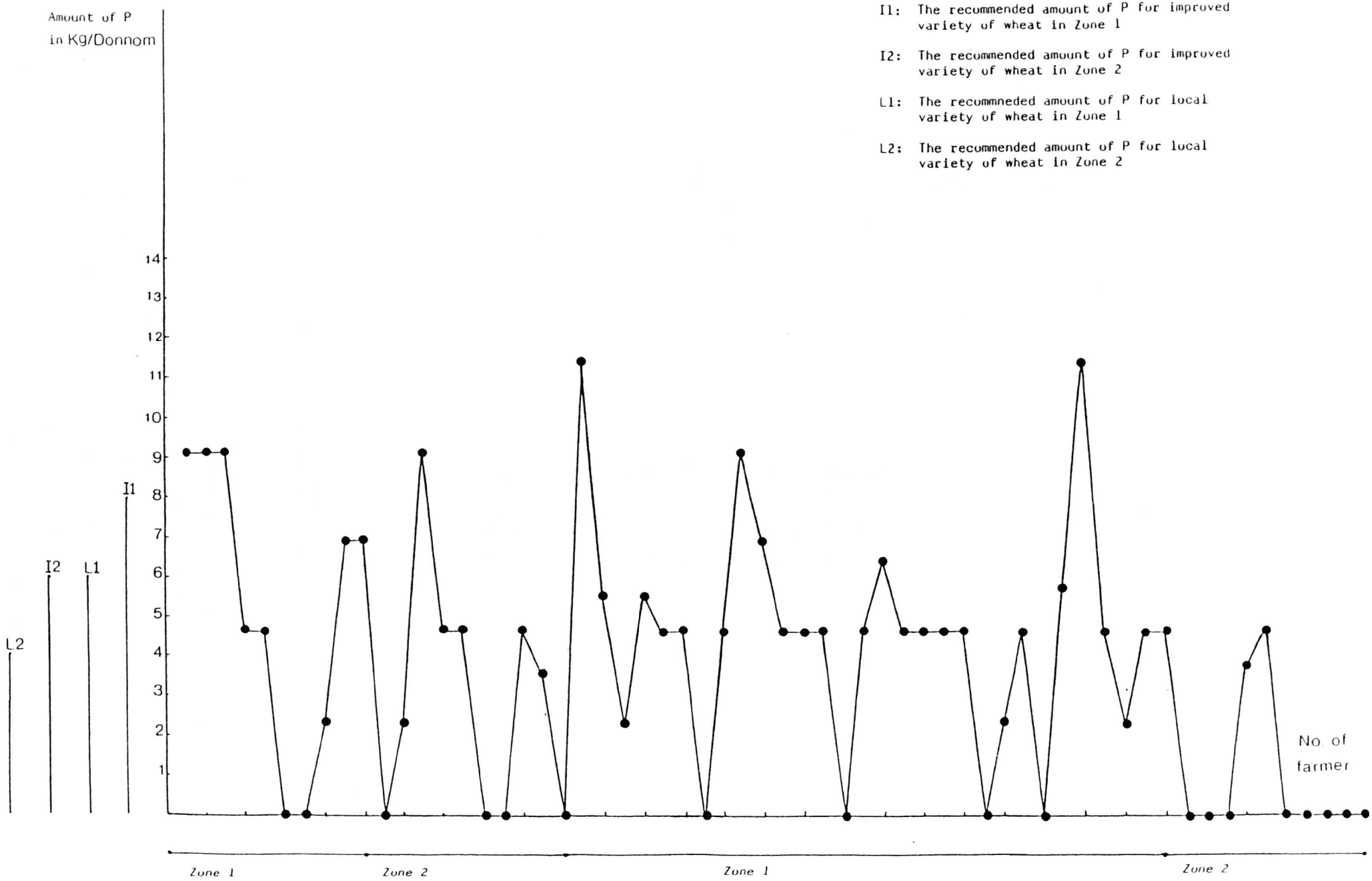
Fig. 5.2 The distribution of farmers by the average amount of phosphorus that have been used

I1: The recommended amount of P for improved variety of wheat in Zone 1

I2: The recommended amount of P for improved variety of wheat in Zone 2

L1: The recommneded amount of P for local variety of wheat in Zone 1

L2: The recommended amount of P for local variety of wheat in Zone 2



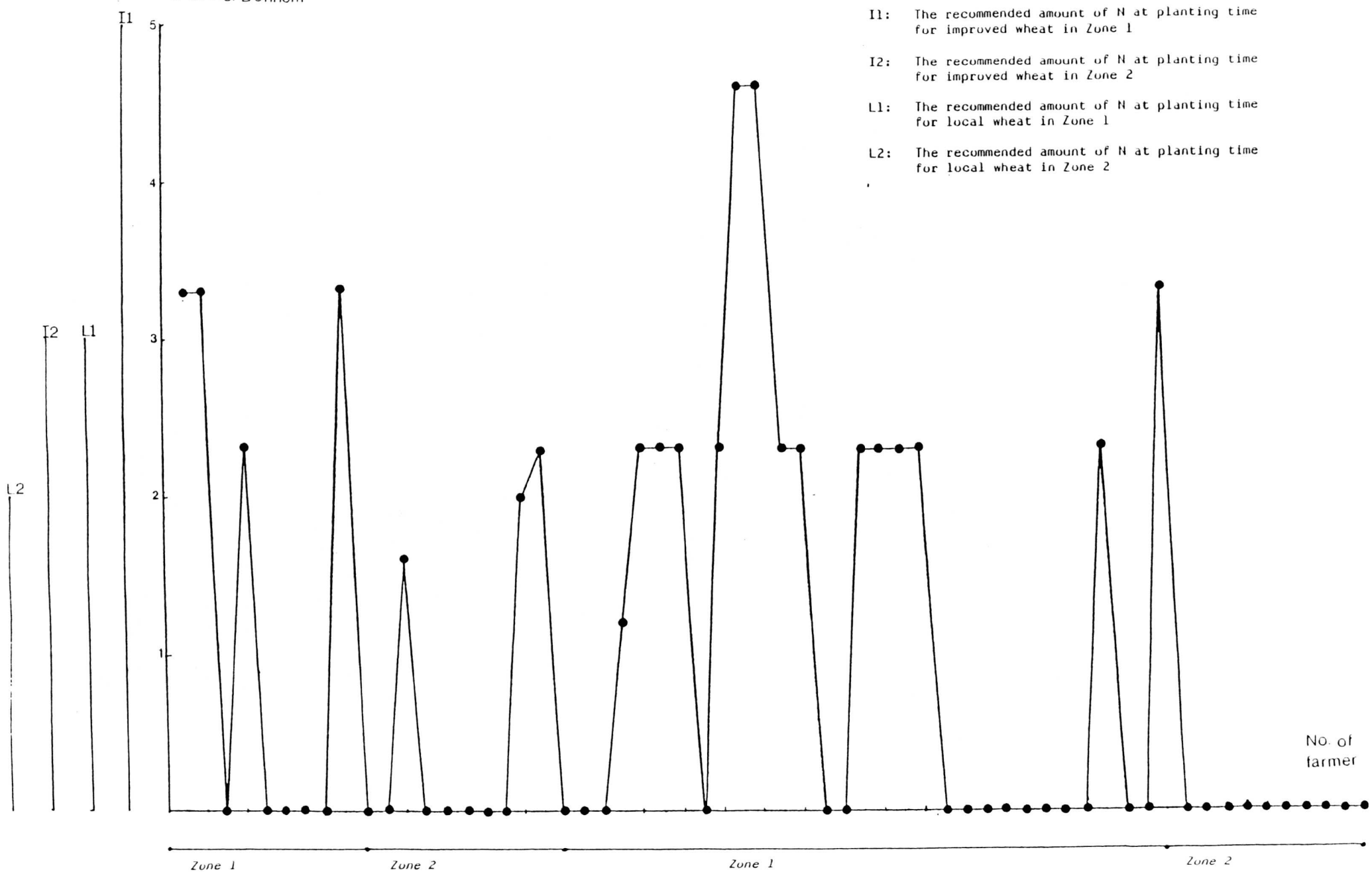


Fig. 5.3 The distribution of farmers by the average amounts of nitrogen that have been used at planting time

I1: The recommended amount of N at planting time for improved wheat in Zone 1

I2: The recommended amount of N at planting time for improved wheat in Zone 2

L1: The recommended amount of N at planting time for local wheat in Zone 1

L2: The recommended amount of N at planting time for local wheat in Zone 2

"mass media" (5%), and "ancestors" (3%). Similarly, the main sources in Zone2 were found to be "neighbours" (55%) followed by the "Extension service" (30%), "mass media" (5%) and the "Cooperative" (10%).

The majority of farmers in both zones obtained their chemical fertilizers from the Government institutes. Some have utilized the institutes directly and others through the village cooperative, Table 5.4.

The popular types of nitrogen chemical fertilizers in both zones were found to be "Urea", some have used "Kalnitro" and a few have used "Ammonium Nitrate", Table 5.5.

5.2.5 Improved varieties

The majority of farmers, (65%), in Zone1 started using improved varieties of wheat during the 1970s while 22.5% started during the 1980s and 12.5% have not started yet. In comparison, 40% of the farmers in Zone2 started in the 1970s whereas 20% started during the 1980s and 40% have not started yet.

This rapid adoption of the improved varieties, particularly in Zone1, in comparison with other innovations such as fertilizers which were introduced to farmers a long time before, could be attributed to the capability of the improved varieties to compete with the local varieties. These new varieties produce a considerably increased yield which is easy to recognize by farmers, Table 5.7.

The percentage of farmers, in Zone1, who have adopted the high yield varieties of wheat and then rejected them was 9%, while in Zone2 the percentage was 8%. On the other hand, the percentage of farmers who have partially adopted the high yield varieties, i.e. they use for only some of their fields, in Zone1 was found to be 10% while in Zone2 the percentage was 27%, Tables 5.8 and 5.9.

5.2.6 Seed renewal

In Zone1, 30% of the farmers started using seeds from outside the farm during the 1970s, 27.5% started during the 1980s and 42.5% have not started yet. In Zone2 in comparison, 40% of the farmers started renewing their seeds during the 1970s, 20% during 1980s and 35% have not started yet, Table

5.7.

Only 2.5% of the farmers in Zone1 have rejected the use of wheat seeds from outside the farm after adoption. In Zone2 the percentage of farmers who rejected seed renewal after adoption was found to be 5%, and another 5% have ceased the adoption for a short period and then continued using seed from outside the farm, Tables 5.8 and 5.9.

Both improved and traditional varieties were used by the sampled farmers. The improved varieties which were identified were "Maxiback", "Jazerah 17", "Jori 69", "Bohoth", "Sham1", "Horani" and "ACSAD", while the traditional varieties were "Horani", "Hamari", "Shehani", "Baydi", "French" and "Italian". More details of these varieties have been discussed by Razzouk, Seabrook and Nordblom (1988).

The most popular improved variety among farmers was found to be "Maxiback", used by 70% of the sampled farmers, while "Horani" of the traditional varieties was the most popular among farmers, used by 47% of the sampled farmers.

A large percentage, 49%, of farmers have been informed and learnt about improved varieties from neighbours, 16% from the cooperative, 11% from the Extension service and 10% from the Agricultural Bank.

The majority of the sampled farmers, 80%, were found to be planting from 11 to 15 kg. of wheat seeds per "Donnom", (Donnom = 1/10 hectare). While only 13% planted over and 7% below this amount. Half of the farmers planted their seeds in November, 37% in October and 13% in December.

5.2.7 Herbicides

In Zone1, only 2.5% of the farmers started using herbicides during the 1960s, 22.5% during the 1970s, 25% during the 1980s and 52.5% have not started yet. In Zone2, the first farmers adopted herbicides in the 1980s, this accounted for 20% of the farmers and 80% have not started yet, Table 5.7.

Only two farmers, one in each zone have rejected herbicides after adoption. Meanwhile, none of the herbicide adopters in Zone1, have ceased their use for one or two seasons and then used again, while one farmer, in Zone2, did so, Tables 5.8 and 5.9.

However, in both zones more than half of the herbicide non adopters,

54%, did not control the weeds in their wheat at all, 30% left their weeds to be controlled by the Government[1], but some of these farmers asked the Government to stop controlling their weeds because they said the control was not effective. The Government agreed to their demand and stopped spraying for more than three years. The farmers did not continue by themselves. The remaining 16% controlled their weeds by hand.

For farmers who did not control their weeds, 67% of them reported a severe weed infestation, 9% and 24% reported a "medium" and "little" weed infestation respectively. When these farmers were asked about the future adoption of herbicides, only 11% said "they would" and 89% said "they would not". The most important reasons given by these farmers for not applying herbicides in future were; "do not know how to use herbicides", "weeds did not affect yields too much", "limited availability of herbicides and spray equipment", "dangerous to use" and "lack of capital".

The majority of farmers, 71%, who controlled their weeds by hand agreed to use herbicides in future when they were asked about the future adoption of them, while the rest said they would not. The most important reasons given for not adopting herbicides in future by these farmers were; "lack of spray equipment", the "non availability of herbicides" and "the cost of herbicides is too high"

Only 36% of farmers, who had their weeds controlled by the Government, were happy with the result being achieved by that control, thus 64% were not. When they were asked to talk about their future use of herbicides, only 18% of them said they "would continue" and 82% "would not continue". When they were asked "why?" most of them said "we do not know how to use herbicides", "we lack spray equipment", "the non availability of herbicides" and some of them have mentioned the "price of herbicides is high", "the herbicide is dangerous", "lack of capital" and "difficulties in using the

[1]The Ministry of Agriculture and Agrarian Reform, through its Directorates of Plant Production in MOHAFAZAT, is helping some farmers, particularly those who were living in the eastern part of the country and who most likely were not familiar with the use of herbicides. These Directorates are fully responsible for buying herbicides and their application on farmers fields by using an aeroplane. Farmers on the other hand are responsible for paying back the price of herbicides and services.

herbicide". Surprisingly, although farmer complaints about the Government control for their weeds always concerned the fact that the herbicide was not effective, none of the farmers has reported that reason for not adopting herbicides in future. This would confirm that farmers have been persuaded that herbicides can kill weeds despite the ineffective result which was achieved. This has also been confirmed by farmers when they were asked why they thought the control was ineffective, all of them said: "the delay in the time of applying the herbicide was the first and the most important reason for this failure". This could be a very valuable result in terms of improving the adoption of herbicides by farmers, Appendix D.

It can be concluded that Government help would be much appreciated if the scheme enabled farmers to use herbicides by themselves. Effective control cannot be achieved unless the farmers themselves are involved in the process.

Fifty nine percent of the farmers learnt about herbicides from "neighbour", 32% "learnt from Extension" and 9% from the "Cooperative".

The type of herbicides which has been used by farmers were "2.4.D.", "Decopocompy" and "Compy Fluid".

5.2.8 Pesticides

None of the farmers who have started using pesticides in 1970s have rejected them, Tables 5.8 and 5.9.

Two type of pests were reported and considered as serious ones if they attack. These were wire worm and rodents. Three incidents of the wire worm infestations were reported at the time of this survey. When farmers who had this problem of wire worm infestation were asked what they would do about it, all of them said: "we are going to control it biologically". When they were asked "how?", they replied "by sheep". Twelve percent of the sampled farmers, most of them from Zone2, have used this kind of control.

The majority of pesticide adopters, 62.5%, have learnt about them from the "Extension service" while the rest have learnt from "neighbours".

5.2.9 Seed bed preparation

The recommended seed bed preparation, in summary, is to cultivate in Summer time, again at the planting time (Autumn) then sowing the seeds and harrowing the ground. In order to classify farmers for later analysis, the "non adopters" of this method were the ones who omitted both cultivations, Summer and Autumn, i.e. they just broadcast the seeds and then harrowed. The "partial adopter" was one who omitted either the Summer or Autumn cultivation.

In Zone1, 20% of the farmers started using the full recommended seed bed preparation during the 1960s, 55% during the 1970s 15% during the 1980s and 10% have not started yet. In Zone2, only 15% started during the 1960s the majority, 65%, started in the 1970s and 15% during the 1980s and 5% have not started yet. The large percentage of farmers in both zones who have started using this method of seed bed preparation during the 1970s is related to the increase in the availability of tractors and subsequent farmer awareness of the importance of tillage, Table 5.7.

The percentage of "partial adopters" of the recommended seed bed preparation in Zone1 was found to be 32.5%, while the percentage in Zone2 reached 45%, Tables 5.8 and 5.9.

Nearly all farmers, 98%, have learnt about the method of seed bed preparation from "neighbours", and "ancestors", while only 2% have learnt from the "Extension service".

5.2.10 Sowing machines

In both zones, the rate of adoption of sowing machines was gradual and lower than the previous innovations. In Zone1 for example only 2.5% of the farmers started using sowing machines before 1960, 27.5% during the 1960s, 22.5% during the 1970s, 17.5% during the 1980s and 30% have not started yet. In Zone2, 10% started before 1960, 20% during the 1960s and 20% during 1970s, 25% during the 1980s and the other 25% have not started yet. This could be related to the fact that farmers might not have perceived the use of sowing machines as an important factor affecting productivity compared to tillage or fertilizers, Table 5.7.

The percentage of farmers who stopped using sowing machines after

adoption, in Zone1 was found to be 2.5% while none of the farmers in Zone2 have stopped using the machine after adoption. Five percent of the sowing machine adopters in Zone1 have for a time ceased adoption while the percentage of farmers in Zone2, who for some season ceased the adoption reached 10%, Tables 5.8 and 5.9. Appendix D also sets out reasons that have been given by farmers for not using sowing machines in the past.

The majority of farmers, 65%, were advised by their neighbours to use sowing machine whereas only 7% were advised by the Extension service, and the rest, 28%, had still not adopted.

5.2.11 Rotation

It was found that most farmers follow a two year rotation and very few follow three to four years rotation, Table 5.6.

The percentage of farmers who fallowed their land in Zone1 was found to be 30% while the percentage in Zone2 reached 70%. This is similar to Nordblom's finding in Idlib Province in (1987). This large difference in land management between the two zones could result from the fact that very limited numbers of alternative crops were available to replace the fallow in Zone2. This explanation can be supported by the following research findings.

It was revealed from the data in Table 5.6 that the major crops which were found to be rotated with wheat to replace the fallow were legumes, mainly lentils, chick-peas, and chichling, and Summer crops such as watermelon, muskmelon (cantaloupe), cotton, tomatoes, sunflowers and sorghum. Legumes are seldom grown in low rainfall areas or in soils of low water holding capacity simply because they are sensitive to moisture stress at flowering. Faba beans are commonly irrigated or restricted to the wettest areas while lentils and chick-peas are grown in the medium rainfall areas of 300 to 600 mm. Newbrg, Sleeper, Eighmy, Hanafi, Ream, Segal and Hyslp,(1982).

Summer crops are grown in areas of more than 350 mm annual rainfall on soils with a high moisture capacity. (Cooper, Gregory, Tully and Harris, (1987)).

This meant that the only possible alternative crops to replace the fallow, or to rotate with wheat, for Zone2 are some of the legumes. Furthermore, legumes have some problems as an alternative crop to replace the fallow. for example, Tully (1984), in his survey in All Bab district in Syria, studied the

feasibility of forage legumes to replace the fallow. He found that the low and variable yield and high production costs compared to the free weedy fallow and native pasture were the main obstacles to adoption of these crops by farmers.

Fallowing the land could also be related to the use of chemical fertilizer, 60% of farmers who fallowed their land in Zone2 were found to be non users of chemical fertilizers. Whereas all of the farmers who did not fallow their land were found to be users of chemical fertilizers. In Zone1, it was found that only 25% of farmers who fallowed their land were non users of chemical fertilizers, while only 7% of the farmers who did not fallow their land were found to be non users of chemical fertilizers.

A summary of the most important features of this review of the adoption of improved practices and innovations of rain-fed wheat by farmers are displayed in Tables 5.7, 5.8 and 5.9. The three Tables show the nine improved practices and innovations which will be used later to construct the adoption variable. These improved practices and innovations are; "nitrogen", "phosphorous", "following the recommended time of applying nitrogen", "using improved varieties of wheat", "seed renewal", "use of herbicides", "use of pesticides", "seed bed preparation" and "use of sowing machines". It can be concluded from this review that generally speaking farmers in Zone2 had more difficulties in the adoption of improved practices and innovations than farmers in Zone1. This particularly was clear in the adoption of fertilizers and methods of fallowing. This again might give an indication that innovations are not so relev ant to Zone2.

This review has lead one to think carefully about the best way for constructing the adoption score for farmers. After having this discussion, it is clear that it is not correct to construct this by merely counting farmers as "adopters", if they adopted the item, or "rejectors" if they did not adopt it, regardless of the date of the uptake of the item by them and the extent of adoption, "partial adopter" or "full adopter". This would not be acceptable because not all farmers who adopted some or all the nine mentioned improved practices and innovations did so at the same rate, Table 5.7. Also,

not all farmers who adopted some or all of the nine practices were found to be using them continuously, Table 5.8 and 5.9. Some farmers ceased the adoption of some of the nine innovations for a time and then adopted again and some have ceased the adoption forever. A line, also, has to be drawn between rejectors of innovations i.e. farmers who have adopted a particular innovation and then have rejected it for some reason, and those who never tried the innovation at all, Tables 5.8 and 5.9. Therefore, a methodology which can consider all these issues is needed. The "Sten score" method used by Rogers, Havens and Cartano (1962) was with slight modification, found to be the one which can fulfil this objective.

5.3 The "Sten Score"

The date of adoption of each improved practice or innovation and the number of improved practices or innovations adopted by each farmer were considered as a base for scoring. Scores of the nine improved practices and innovations for each farmer were additive. The maximum score, as will be seen later in this chapter, obtained by each farmer for each improved practice or innovation was 9, i.e. for earliest adoption. Thus a sum of 81 was possible with all nine improved practices and innovations.

The scoring of farmers related to the nine selected improved practices and innovations was based on the modification of "Sten Score" methods of Rogers, Havens and Cartano (1962). This technique was for measuring the innovativeness of farmers i.e. ".....the degree to which an individual or other unit of adoption is relatively earlier in adoption of new ideas than other members of a social system" (Rogers, 1983). The method itself, in essence, is based on time of adoption of a particular agricultural practice by every individual in the study sample. It operates as follows: adopter farmers are rank ordered according to their date of adoption. Further, they are then categorized into ten groups based on equal division of a statistically normal distribution. In other words, the distribution of dates of adoption for these adopter farmers is 'normalized'. Such a distribution would have an "S" shape when presented in a cumulative form. Thus, the numbers, or proportions, of adopters in each division, to which scores are given, varies along the curve. However, in "Sten Score" method, (i.e. normalized curve), the earliest tenth of the curve, 2.3%, of a subject is given a score of 9, the next tenth, 4.4%, is given a score of 8 etc., (Jones 1966), Table 5.10 and

Appendix A.

The proportion of farmers obtaining each score by Sten Score should be rounded to the nearest whole number if it is not an integer. Moreover, the various "Sten Scores" obtained by each farmer for different practices are additive.

For the purpose of this study, the "Sten Score" suffers from two important deficiencies.

First, it gives low scores to farmers who were late to adopt. This could be simply because they have not become a farmer until an innovation was well established in the system even though they adopt it immediately. For example, suppose an innovation X was introduced to some farmers in 1970, and suppose among these farmers there were two farmers A and B. Farmer A was in the farming business before the introduction of the innovation X and farmer B started farming in 1980. Assuming farmers A and B adopted the innovation X in 1980, then according to the "Sten Score", both farmers are given the same score despite the ten years delay in adopting the innovation X by farmer A. However, this defect would have been solved by use of the "Double Sten Score" which comes from the development of "Sten Score" by Jones (1966). This requires a knowledge of the date of introduction of each of the nine selected practices, into Syria.

The second disadvantage is that the "Sten Score" neglects the distinction between farmers who persist with an adoption, those who have a period of interrupted use, those who did not use the practice continuously, and those who ceased adoption forever.

In summary, the method which is used for scoring farmers on the nine selected improved practices and innovations was based on the modification of "Sten Score" of Rogers, Havens and Cartano (1962). It was as follows:

1. The range of scores are from 0 for those who never tried the practice to 9 for the earliest in adoption ("Sten Score" itself with no modifications).

2. Scores obtained by farmers, using "Sten Score" method, for the nine selected improved practice and innovations were treated as follows:

- They were kept the same if the farmer persisted with the adoption of a practice, (adopter).
- They were halved if there was an interruption in his adoption after the acceptance, (partial adopter)
- They were reduced to a third if he has adopted and rejected the practice, (rejector 1). Farmers who have never tried a practice, (rejector 2), were given score of 0. Rejector 1, however, could be called an "active rejector" while rejector 2 might be called a "passive rejector" according to Eveland (1979).

  The maximum scores for the nine innovations and improved practices is 9 x 9 = 81 if the farmers adopted the nine innovations before most other farmers.

To illustrate how this method works, let us take the adoption of nitrogen, for example, by four farmers A, B, C,and D. Assume the first three farmers A, B, and C adopted nitrogen in the same year while farmer D did not. Farmer A was found to be a regular user of nitrogen, (always using since the adoption), farmer B was found to be irregular user, (some years used N and some did not) and farmer C had used nitrogen only for one year and then rejected it. According to "Sten Score" method, the three farmers A, B, and C are given the same score simply because they have adopted nitrogen at the same time, but D is given 0 . Supposing the score which was obtained by the three farmers A, B, and C by using "Sten Score" was 6, in the "modified method" this number 6 would not be the same for the three farmers as in "Sten Score". It would be treated in this theses as follows:

1. This score was kept for Farmer A as it is, i.e 6, (Farmer A is "adopter");
2. This was halved for Farmer B, i.e. 3, (Farmer B is a "partial adopter");
3. This was divided by three to Farmer C, i.e. 2, (Farmer C is a "rejector")

   However, farmer D keeps the same score in the modified method as it is obtained by "Sten Score" which is 0, (Farmer D is also a rejector).

For the improved wheat varieties, due to the nature of the collected data, there was a slight change for the definition of the "adopter" and "partial adopter". "Adopter" was defined as the one who adopted an improved variety or varieties and rejected local, traditional, variety or varieties. Or alternatively one who adopted improved varieties and used them predominantly over local varieties. "Partial adopter" was defined, as one who adopted improved varieties but still used the local one predominantly.

In order to see how accurate and relevant the modified Sten Score is in terms of classifying farmers based on their time of adoption, it was evaluated against other methods. These methods were based on the latest adoption situation and the extent of adoption of innovations by farmers.

1. Method I: In this method, farmers were classified into four groups as follows:

    - "Adopters" are counted as those who adopted the practice or innovation and persisted with adoption. A score of 3 was given for every farmer who meet these characteristics for each of the nine practices or innovations.
    - "Adopters in part" are counted as those who adopted the practice or innovation but they did not persist with adoption, i.e. in some years they gave up adoption of a particular practice or innovation and in some years the continue in adopting that practice or innovation. A score of 2 was given for every farmer who has this pattern of adoption behaviour.
    - "Rejectors - I" are the ones who adopted the practice or the innovation and ceased the adoption of it forever. Every farmer who rejected the item after adoption was given a score of 1.
    - "Rejector - 2" are the ones who did not try the practice or the innovation at all. They were given a score of 0.

    The maximum score obtained by this method for the nine selected practices by a farmer is 9 x 3 = 27. The 27 can be obtained by a farmer when he adopted the nine practices or innovations and persists with adoption.

2. Method II

This method is actually built on Method I. It puts "adopters" and "adopters in part" in one group and allocates to every farmer belonging to this group a score of 1. It also puts "Rejectors - 1" and "Rejectors - 2" in other group and allocates to every farmer belongs to this group a score of 0.

The maximum score obtained by this method for the nine selected practices by a farmer is 9 x 1 = 9. The 9 can be obtained by a farmer who adopted the nine practices or innovations fully or partially.

Method I and Method II individually show a high and positive correlation with the "Sten score" and the "Modified Sten Scores" (Table 5. 11). This would suggest that the early adopter farmer is the one who adopts more and continues in adoption while the late adopter farmer is the one who adopts less and did not persist with adoption. This would confirm the reliability of the method used, Modified Sten Score, for generating adoption behaviour scores for farmers.

So, time, quantity and quality of adoption by farmers were considered in this study . The high adopting farmer was the one who adopted first, adopted the full package and kept up the adoption.

There is always the possibility that by amalgamating scores for number of different innovations might mask the effect of the characteristics of the innovations e.g. new seed compared to the use of a new machine. In this study the limitations imposed by amalgamation are reduced because much emphasis is also made to farmers' satements and comments about innovations. In fact it appears that for the farmers in this study the different characteristics of the innovations are not important in affecting adoption. This also can be supported by the nature of the correlation between the four methods which have been discussed before (see Table 5.11).

Farmers in every zone were treated separately in scoring them. (see Appendix A). This was because of the differences in time of releasing some of the improved practices and innovations in each zone.

The most important reason for choosing farmers from two zones was to make comparison between the two zones in terms of the adoption behaviour

of farmers as well as for other issues. For example the adoption of innovations in Zone1 have started a little before Zone2. Farmers' experiences in Zone1 could be of vital consideration for improving the adoption behaviour of farmers in Zone2 particularly for the adoption of the most recent released innovations. If however there was no such institutional constraints between the two zones it could have been preferable to restrict the sample of farmers to a larger one for one zone.

5.4 The application of "Sten Score" and its modification for constructing farmer adoption scores for analysis

The application of "Sten Score", with reference to the data collected from the field about the time of uptake of the nine improved practices and innovations by farmers, has resulted in the construction of Adoption Behaviour Scores, for every farmer. The application of the theory in section 5.3 of this Chapter on the Adoption Behaviour Scores before modification has lead to the construction of the final modified Adoption Behaviour Score, based on the "Sten Score" concept. (See Appendix A).

In both zones, the Adoption Behaviour Scores before modification and the Adoption Behaviour Scores after modification show a high and positive correlation between each other, r=0.9875 and r=0.9173, for Zone1 and Zone2 respectively. This would suggest that farmers who take up the innovation first are more likely to continue its adoption rather than those who adopt later on. Also the differences in the level of association between Zone1 and Zone2 would suggest more difficulties facing the later adopters in Zone2 than in Zone1. Since the Adoption Behaviour Scores after the modification are more accurate in discriminating farmers than the Adoption Behaviour Score before the modification, the Adoption Behaviour Scores after modification was used for this study.

The Adoption Behaviour Scores obtained reflected the absolute level of adoption of the improved practices, and this concept will be used in the correlation and analysis of Variance Analysis, ANOVA. However, due to the differences in Zone1 and Zone2 in time of introduction of innovations and climatic and soil factors there is also a need to present the analysis so that it reflects the relative rate of adoption in each Zone. Thus having obtained

the Adoption Behaviour Score for every farmer farmers, were then classified into three groups according to the relative level of their Adoption Behaviour Scores. The classification was based on dividing the full range of scores for each zone into three segments. For example in Zone1 the maximum score was 62, and thus the LOW adopter farmers have from 0 to 20, Medium adopters have from 21 to 41. This approach in fact gives a fairly distinct distribution of farmers in three categories based on their adoption behaviour score. So, in Zone1 farmers with an Adoption Behaviour Score from 5 to 20 were counted as LOW adopters. Farmers with Adoption Behaviour Scores ranging from 21 to 41 were counted as MEDIUM adopters, and farmers with Adoption Behaviour Scores ranging from 42 to 62 were counted as a HIGH adopters. According to this classification the percentage of LOW, MEDIUM and HIGH adopters was found to be 25%, 57.5% and 17.5% respectively.

In Zone2, farmers with Adoption Behaviour Scores ranging from 2 to 15, from 16 to 30 and from 31 to 46 were counted as LOW, MEDIUM and HIGH adopters respectively. According to this classification, the percentage of LOW, MEDIUM and HIGH adopters was found to be 45%, 40% and 15% respectively.

So, for the purpose of simplification and understanding, the "absolute" Adoption Behaviour Scores of farmers have been split for each zone into three groups, "relatively" HIGH, MEDIUM, and LOW adoption scores. Consequently, the results in later analysis might look slightly different from each other when the two measurements are taken into account, i.e. "absolute" adoption behaviour and "relative" adoption behaviour. This dual approach gives a much deeper insight into the behaviour of farmers.

Comparing the absolute Adoption Behaviour Scores of farmers in Zone2 with the Adoption Behaviour Scores of farmers in Zone1, almost all farmers

in Zone2 would fall under the MEDIUM and LOW adopter groups of Zone1. This would suggest that farmers in Zone2 have still not yet been encouraged so far in their adoption behaviour. Further, most of the Adoption Behavior Scores of farmers in Zone2 are closer to each other, i.e. the variation among these scores is not as high as in Zone1. This might cause problem for later analysis. Consequently, some important and discriminant factors might be impeded, hence the use of the "relative" score as well as the "absolute" scoring system.

5.5 Summary

Adoption Behaviour Scores have been generated for every farmer and also for each zone farmers have been classified by level of adoption. These scores and categories will be used in later analysis to investigate factors which might influence the level of adoption of wheat practices.

In the following chapter an analysis and discussion is made on the effect of some of the Personal and Socio-Economic characteristics on the adoption behaviour of farmers.

Table 5.1: The distribution of farmers by their adoption of chemical fertilizers

Category	Zone1 %	Zone2 %
Adopter	87.5	55.0
Rejector	12.5	45.0

Table 5.2: "t" test, showing the level of differences between the recommended amount of Nitrogen and Phosphorous and the actual amounts that have been used by different groups of farmers in different areas

			M	$\bar{X}$	S	SE	df (n-1)	t	p
Total N	Zone 1	Im	10	7.13	3.26	0.64	25	-4.49	< 0.001
		Lc	6	4.87	2.79	0.93	8	-1.22	NS
	Zone 2	Im	6	4.95	0.80	0.40	3	-2.63	NS
		Lc	4	6.20	3.85	1.57	5	1.41	NS
Total P	Zone 1	Im	8	6.00	2.45	0.48	25	-4.17	< 0.001
		Lc	6	4.31	1.47	0.52	7	-3.25	< 0.05
	Zone 2	Im	6	4.32	0.64	0.37	2	-4.78	0.05
		Lc	4	4.86	2.55	1.14	4	0.76	NS
Total N	Zone 1	Im	5	2.87	0.81	0.21	14	-10.14	< 0.001
at pla-		Lc	3	2.03	0.56	0.28	3	0.11	NS
nting	Zone 2	Im	3	2.15	0.21	0.15	1	-5.67	NS
time		Lc	2	1.60	-	-	-	-	-

Im: Improved variety of wheat, Lc: Local variety of wheat, N: Nitrogen, P: Phosphorous, M* recommended amounts of Nitrogen and Phosphorous in Kg, $\bar{X}$, the average amount of Nitrogen and Phosphorous that has been used by that group of farmers, NS: Not significant, t: t test, p: probability, df:degree of freedom,

$$S = \sqrt{\frac{\sum(X - \bar{X})^2}{n-1}}$$

S: Standard deviation

$$SE = \frac{S}{\sqrt{n}}$$

, SE: Standard Error

$$t = \frac{\bar{X} - M}{SE}$$

Table 5.3: "t" test statistical analysis for Nitrogen and Phosphorous practices between "Extension contacting farmers" and "non contacting farmers" in the two stability zones

				M	$\bar{X}$	S	SE	df (n-1)	t	p
Total N	Zone 1	Im	Con	10	9.40	2.52	0.76	10	-0.79	NS
			No	10	5.46	2.79	0.72	14	-6.31	< 0.001
		Lc	Con	6	5.95	1.91	1.35	1	-0.04	NS
			No	6	4.56	3.05	1.15	6	-1.25	NS
	Zone 2	Im	Con	6	4.95	0.80	0.40	3	-2.63	NS
			No	6	-	-	-	-	-	-
		Lc	Con	4	4.10	1.27	0.90	1	0.11	NS
			No	4	7.25	4.45	2.23	3	1.46	NS
Total P	Zone 1	Im	Con	8	7.30	1.09	0.33	10	-2.94	< 0.05
			No	8	5.27	2.63	0.63	14	-4.02	< 0.01
		Lc	Con	6	4.60	-	-	-	-	-
			No	6	4.27	1.59	0.60	6	-2.88	< 0.05
	Zone 2	Im	Con	6	4.23	0.64	0.37	2	-4.78	0.05
			No	6	-	-	-	-	-	-
		Lc	Con	4	2.30	-	-	-	-	-
			No	4	5.50	2.44	1.22	2	1.23	NS
Total N at planting time	Zone 1	Im	Con	5	3.14	0.96	0.32	8	-5.82	< 0.001
			No	5	2.47	0.42	0.17	5	-14.88	< 0.001
		Lc	Con	3	2.30	-	-	-	-	-
			No	3	1.93	0.64	0.37	2	-2.89	NS
	Zone 2	Im	Con	3	2.15	0.21	0.15	1	-5.67	NS
			No	3	-	-	-	-	-	-
		Lc	Con	2	1.60	-	-	-	-	-
			No	2	-	-	-	-	-	-

Im: Improved variety of wheat, Lc: Local variety of wheat, N: Nitrogen, P: Phosphorous, M recommended amounts of N and P, NS: Not significant, Con: "contact with extension", No: "No contact with Extension".

Table 5.4: The distribution of farmers by sources of chemical fertilizers in Zone1 and Zone2

	Zone1			Zone2		
	Gov. institutes		Private	Gov. institutes		Private
	Direct	Indirect		Direct	Indirect	
No. of farmers	9	18	8	3	5	3
% of farmers	26	51	23	27	46	27

Table 5.5: The distribution of farmers by the types of chemical fertilizer used

	Zone1					Zone2				
	U	K	A	U+K	U+K+A	U	K	A	U+K	U+K+A
No. of farmers	13	0	1	19	2	6	1	1	2	0
% of farmers who use	37	0	3	54	6	60	10	10	20	0

U: Urea, K: Kalnitro, A: Ammonium

Table 5.6: The distribution of farmers by crop rotation

No. of years	Sequence of the rotated crops	No. of farmers	%
Two year rotation	Wheat - Fallow	26	43
	Wheat - Legume (and/or Summer crop)	29	48
	Wheat - Barley	1	2
Three year rotation	Wheat - Barley - Legume	2	3
	Wheat - Wheat - Legume	1	2
Four year rotation	Wheat - Legume - Barley - Summer crop	1	2

Table 5.7: The distribution of farmers by the year of adoption

Innovations	Years of adoption	Zone1		Zone2	
		No.	%	No.	%
1.Nitrogen	Before 1960	3	7.5	0	0.0
	1960 to 1969	2	5.0	0	0.0
	1970 to 1979	21	52.5	2	10.0
	1980 to 1987	9	22.5	8	40.0
	Not yet	5	12.5	10	50.0
2.Phosphorous	Before 1960	2	5.0	0	0.0
	1960 to 1969	2	5.0	0	0.0
	1970 to 1979	15	37.5	1	5.0
	1980 to 1987	14	35.0	7	35.0
	Not yet	7	17.5	12	60.0
3.Following	Before 1960	0	0.0	0	0.0
the recommen-	1960 to 1969	0	0.0	0	0.0
ded time of	1970 to 1979	5	12.5	0	0.0
applying	1980 to 1987	15	37.5	4	20.0
nitrogen	Not yet	20	50.0	16	80.0
4.Using of	Before 1960	0	0.0	0	0.0
improved	1960 to 1969	0	0.0	0	0.0
varieties	1970 to 1979	26	65.0	8	40.0
of wheat	1980 to 1987	9	22.5	4	20.0
	Not yet	5	12.5	8	40.0
5.Seed	Before 1960	0	0.0	0	0.0
renewal	1960 to 1969	0	0.0	0	0.0
	1970 to 1979	12	30.0	8	40.0
	1980 to 1987	11	27.5	5	25.0
	Not yet	17	42.5	7	35.0

Innovations	Years of adoption	Zone1		Zone2	
		No.	%	No.	%
6.Using	Before 1960	0	0.0	0	0.0
herbicides	1960 to 1969	1	2.5	0	0.0
	1970 to 1979	9	22.5	0	0.0
	1980 to 1987	10	25.0	4	20.0
	Not yet	21	52.5	16	80.0
7.Using	Before 1960	0	0.0	0	0.0
pesticides	1960 to 1969	0	0.0	0	0.0
	1970 to 1979	4	10.0	0	0.0
	1980 to 1987	4	10.0	0	0.0
	Not yet	32	80.0	20	100.0
8.Seed bed	Before 1960	0	0.0	0	0.0
preparation	1960 to 1969	8	20.0	3	15.0
	1970 to 1979	22	55.0	13	65.0
	1980 to 1987	6	15.0	3	15.0
	Not yet	4	10.0	1	5
9.Use of	Before 1960	1	2.5	2	10.0
sowing	1960 to 1969	11	27.5	4	20.0
machines	1970 to 1979	9	22.5	4	20.0
	1980 to 1987	7	17.5	5	25.0
	Not yet	12	30.5	5	25.0

Table 5.8: The distribution of farmers by their level of adoption and rejection in Zone1

Improved practices and innovations		1 Never adopted	2 Adopted and rejected	3 Adopted partially	4 Adopted fully	5 (1+2) Rejector	6 (3+4) Adopter
1.Nitrogen	No.	5	0	4	31	5	35
	%	12.5	0.0	10.0	77.5	12.5	87.5
2.Phospho-	No.	7	0	4	29	7	33
rous	%	17.5	0	10.0	72.5	17.5	82.5
3.Following	No.	20	0	0	20	20	20
the recomm-	%	50.0	0.0	0.0	50.0	50.0	50.0
ended time of applying nitrogen							
4.Using	No.	5	3	3	29	8	32
improved	%	12.5	7.5	7.5	72.5	20.0	80.0
varieties of wheat							
5.Seed	No.	17	1	0	22	18	22
renewal	%	42.5	2.5	0.0	55.0	45.0	55.0
6.Using	No.	21	1	0	18	22	16
herbicides	%	52.5	2.5	0.0	45.0	55.0	45.0
7.Using	No.	32	0	0	8	32	8
pesticides	%	80.0	0.0	0.0	20.0	80.0	20.0
8.Seed bed	No.	4	0	13	23	4	36
preparation	%	10.0	0.0	32.5	57.5	10.0	90.0
9.Use of	No.	12	1	2	25	13	27
sow ing	%	30.0	2.5	5.0	62.5	32.5	67.5
machines							
Mean	No.					129	231
	%					36.0	64.0

Table 5.9: The distribution of farmers by the their level of adoption and rejection in Zone2

Improved practices and		1 Never adopted	2 Adopted and rejected	3 Adopted partially	4 Adopted fully	5 (1+2) Rejector	6 (3+4) Adopter
1.Nitrogen	No.	10	4	3	3	14	6
	%	50.0	20.0	15.0	15.0	70.0	30.0
2.Phospho-	No.	12	3	1	4	15	5
rous	%	60.0	15.0	5.0	20.0	75.0	25.0
3.Following	No.	16	1	0	3	17	3
the recomm-	%	80.0	5.0	0.0	15.0	85.0	15.0
ended time of applying nitrogen							
4.Using	No.	8	1	3	8	9	11
improved	%	40.0	5.0	15.0	40.0	45.0	55.0
varieties of wheat							
5.Seed	No.	7	1	1	11	8	12
renewal	%	35.0	5.0	5.0	55.0	40.0	60.0
6.Using	No.	16	2	1	1	18	2
herbicides	%	80.0	10.0	5.0	5.0	90.0	10.0
7.Using	No.	20	0	0	0	20	0
pesticides	%	100.0	0.0	0.0	0.0	100.0	0.0
8.Seed bed	No.	1	0	9	10	1	19
preparation	%	5.0	0.0	45.0	50.0	5.0	95.0
9.Use of	No.	5	0	2	13	5	15
sowing	%	25.0	0.0	10.0	65.0	25.0	75.0
machines							
Mean	No.					107	73
	%					59.0	41.0

Table 5.10: Sten Score, the basis of scoring

Tenth from the mean	Percentage under curve	Sten Score
-5 to -4	2.3	9
-4 to -3	4.4	8
-3 to -2	9.2	7
-2 to -1	14.9	6
-1 to 0	19.2	5
0 to 1	19.2	4
1 to 2	14.9	3
2 to 3	9.2	2
3 to 4	4.4	1
4 to 5	2.3	0

Table 5.11: The degree of association between the four methods for scoring farmers' adoption behaviour for the nine selected practices and innovations

Sten Score	1.0000		
Modified Sten Score	0.9794	1.0000	
Method I	0.9324	0.9093	1.0000
Method II	0.9209	0.8932	0.9753

CHAPTER 6

The Syrian Farmers Studied:-Personal and Socio-Economic Factors

6.1 Introduction

The aim of this chapter is to investigate some of the personal and socio-economic characteristics amongst the sampled farmers and to investigate how these factors might have influenced the adoption behaviour of farmers. The inter-relationships between these factors are also considered in order to help in interpreting the results and facilitating discussion. These personal and socio-economic characteristics or factors include; "farm size", "fragmentation of the farm land", "age", "years of farming", "farmer's education", "residency outside the home village", "family size, type and education", "dependency on family labour", "involvement of wife in the decision making process" and "family, wife's and other members involvement in the decision making process".

Many of these characteristics have been emphasized as important by several researchers in explaining the adoption behaviour of farmers.

6.2 Results From the survey data

6.2.1 Age

It is generally believed that older farmers are more resistant to change than younger farmers. This is built on the notion that older farmers might resist because of the fear of the loss of their financial and economic security and hence their status and prestige. Their current economic position might be strong enough to keep them in the way they want to be, therefore, they see little reason to change. Younger people in comparison, however, are thought to be less opposed to change. This is because their economic position might not be strong enough to satisfy their aspirations from life. Therefore, they

might adopt easily because of that reason and are more willing to take more risk because they have nothing to lose.

In this survey more than half of the sampled farmers, 53.3%, were found to be over 45 years of age, 28.3% from 35 to 45 years and 18.3% were found to be less than 35 years old, Table 6.1.

In Zone1, the majority of the HIGH adopters, (71%), were found to be over 45 years of age compared to 65% and 40% of the MEDIUM and LOW adopters respectively. None of the HIGH adopters were found to be less than 35 years of age while 13% of the MEDIUM adopters and 10% of the LOW adopters were found to be less than 35 years of age. In Zone2, the percentage of younger farmers, less than 35 years, in the LOW adopters category, had increased remarkably to form 44.4% of the LOW adopters. As has previously been discussed adoption behaviour was less in Zone2 and some innovations were introduced later into Zone2. Thus, it might be anticipated that a different set of relationships might be found in the analysis of Zone1 compared to Zone2.

In both zones, age and Adoption Behaviour Scores of farmers were found to be positively but not significantly correlated, r=0.0876 and r=0.1930 for Zone1 and Zone2 respectively, Table 6.26.

6.2.2 Farm size

In general terms, farmers with large farms are usually encouraged by the economic return of their profitable farm to take risks and adopt more innovations, while farmers on small farms have not got that incentive because they live at a subsistence level. In addition, a smaller farm by its nature would not allow such innovations like mechanization to operate, therefore, farmers under these circumstances might be forced to be in a low adoption category.

The majority of farmers, 61.7%, own or rent or share, an area of land between 70 to 250 Donnom (1/10 hectare), 15% had a farm size less than 70 Donnom while only 6.7% had a farm size above 500 Donnom, Table 6.3.

In Zone1, none of the HIGH adopter farmers were found to be cultivating an area of land of less than 7 hectares, (70 Donnom), compared to 13% and 20% of the MEDIUM and LOW adopters respectively. In comparison, none

Table 6.1: The distribution of farmers by their age

Age (years)	% of farmers in Zone1 + Zone2	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
< 35	18.3	10.0	35.0
35 - 45	28.3	30.0	25.0
> 45	53.3	60.0	40.0

Table 6.2: The distribution of HIGH, MEDIUM and LOW adopters according to their age

Age (years)	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
< 35	0.0	13.0	10.0	33.3	25.0	44.4
35 - 45	28.6	21.7	50.0	33.3	25.0	22.2
> 45	71.4	65.2	40.0	33.3	50.0	33.3

Note: In this Table and in the following tables throughout the thesis the following letters mean; H: A group of HIGH adopter farmers, M: A group of MEDIUM adopter farmers, L: A group of LOW adopter farmers. Number in brackets refers to number of farmers.

of the HIGH adopters in Zone2 were found to be cultivating an area of land of less than 7 hectares, compared to 12.5% and 33.3% of the MEDIUM and LOW adopters respectively, Table 6.4.

In both zones, a positive association was found between the Adoption Behaviour Scores of farmers and their farm size, r=0.0946 and r=0.5746 for farmers in Zone1 and Zone2 respectively. In Zone1 the level of association was very weak while in Zone2 it was significant at $p<0.01$. This would suggest the importance of farm size in Zone2 as an explanatory factor for the adoption behaviour of farmers.

Since farm size was found not to be a significant factor for the adoption of innovations in Zone1 it is worth examining the size of area devoted for wheat on the farm as an alternative measure. However, the area devoted for wheat also showed a positive but not significant relation with the Adoption Behaviour Scores of farmers, r=0.2072. This would suggest that neither the size of the plot devoted for wheat on the farm nor the size of the farm itself were important factors for explaining the adoption behaviour of farmers in Zone1.

However, this conclusion seems to suggest a different story if it is compared with the data displayed in Table 6.4. The data in the table suggest that the relation between Adoption Behaviour Scores of farmers and farm size should be stronger than the one shown above. This contradiction is related to the fact that there is one farmer in the sample who has a very large farm size (300 hectare owned plus 550 rented) which is deviating too much from the rest of the farm size of the sample. When, however, this large farm is treated as missing variable for that farmer, then the relation between farm size and the Adoption Behaviour Scores of farmers exists at the significant level, r=0.3716.

6.2.3 Fragmentation

Usually farms with fragmented land are not easy to manage. Fragmentation could be a severe obstacle facing the application of such innovations especially those related to mechanization. Therefore, farmers who were cultivating fragmented farms are expected to lag behind other farmers in relation to the adoption of innovations and improved practices.

Table 6.3: The distribution of farmers by their farm size

Farm size (Donnom)	% of farmers in Zone1 +Zone2	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
< 70	15.0	12.5	20.0
70 - 250	61.7	65.0	55.0
251 - 500	16.7	15.0	20.0
> 500	6.7	7.5	5.0

Table 6.4: The distribution of HIGH, MEDIUM and LOW adopters according to their farm size

Farm size (Donnom)	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
< 70	0.0	13.0	20.0	0.0	12.5	33.3
70 - 250	57.1	65.2	70.0	66.7	50.0	55.6
251 - 500	28.6	13.0	10.0	0.0	37.5	11.1
> 500	14.3	8.7	0.0	33.3	0.0	0.0

More than half of the farmers, 56.7%, have a total number of plots of between two to five, only 8.3% have only one plot, 23.3% have from 6 to 10 plots and 11.7% have more than 10 plots, Table 6.5.

In Zone1, none of the HIGH and MEDIUM adopters have a farm as one plot compared to 20% of the LOW adopters. The percentage of HIGH adopters who have fragmented farms of more than 10 plots was found to be 42.9% compared to 13% of the MEDIUM adopters and 0% of the LOW adopters. In Zone2, none of the HIGH adopters were found to have farms as one plot compared to 12.5% and 11.1% of the MEDIUM and LOW adopters respectively, Table 6.6.

In both zones, a positive relation was found between the number of plots making up the farms and the Adoption Behaviour Scores of farmers, r=0.5103, which is significant at P<0.01 and r=0.4097 which is not significant at p=0.05 for Zone1 and Zone2 respectively, Table 6.26. This finding in both zones was found to be in contrary to what was expected. This meant that farmers with more fragmented land were found to be in a better position for the adoption of innovations than farmers with consolidated farm land. This is against the hypothesis which says: "farmers with a fragmented farm are likely to be adopting less innovations than farmers with a consolidated farm". This could be related to a number of reasons; firstly, fragmented farms were found to be associated positively, but not significantly, with the farm size, r=0.1641 for Zone1. This gives an indication that fragmented farms had a larger size and the consolidated ones were the small farms. Secondly, in the past, a large percentage of farmers used to cultivate farms which belonged to the LIEGE (part of the Feudal System). Although these farms were large in size, they were highly fragmented. However, when the Agrarian Reform Law was introduced to Syria in the early 1960s some of these farms were left to the Lieges and the Lieges in turn sold them, as they were, i.e. fragmented, to the farmers who were cultivating them. Some farmers have consolidated their farm land to some extent and some have not, therefore their farms were still fragmented although they were relatively large in size. Thirdly, some farmers, especially in the eastern part of the country, El-Jazerah, were found to be cultivating very large farms for

Table 6.5: The distribution of farmers by the number of plots

Number of plots	% of farmers in Zone1 + Zone2	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
1	8.3	7.5	10.0
2 - 5	56.7	50.0	70.0
6 - 10	23.3	27.5	15.0
> 10	11.7	15.0	5.0

Table 6.6: The distribution of HIGH, MEDIUM and LOW adopters according to the number of plots on their farms

Number of plots	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
1	0.0	0.0	20.0	0.0	12.5	11.1
2 - 5	14.3	56.5	70.0	33.3	62.5	88.9
6 - 10	42.9	30.4	10.0	66.7	12.5	0.0
> 10	42.9	13.0	0.0	0.0	12.5	0.0

example 850 hectares for one farmer in this survey. These large farms do not belong only to the farmer who was cultivating them because the Agrarian Reform Law would not allow such a huge property like these to be owned by one farmer. In fact, a large part of these farms were found to be belonging to other farmers. Those farmers have let their farms to this particular type of farmer who can afford to farm them properly. Most of the let farms were relatively small, 7- 25 hectare. As a consequence, the large farm would be formulated from many plots. However, these particular farmers could consolidate these plots into large fields and cultivate them together and hence in practice they are not generally fragmented. Therefore, the farms appear to be fragmented because they have many owners but in fact they were farmed as a united unit. Fourthly it could be that farmers in fragmented land could be motivated by their fragmented farm to become a real successful manager. However, fragmentation was not found to be a problem for carrying out the adoption of farm innovations by farmers. This is not meant to recommend more fragmentation in order to encourage the adoption of more innovations! Fragmentation was not a problem because the sizes of the plots were still sufficiently large to allow such innovations to be applied. The disadvantages of fragmentation definitely will appear in the forseeable future and would be a major problem for the adoption of new technologies. This is because a good percentage of plots which were investigated in this survey were found to be at a minimum level to allow mechanization to take place and some of them in fact were found to be too small. This was confirmed by farmers when they were asked about the use of sowing machines and the application of herbicides and chemical fertilizers

6.2.4 Family size and labour

The notion here is that the large sized family has more labour available than a small one. Family labour includes the farmer, his wives, children, grandchildren and relatives who might stay with the family. This labour is considered to be cheap or unpaid labour and necessary to meet the rising demand for labour associated with innovations and improved practices.

The percentage of farmers who have a small family size, less than eight persons, was found to be only 8.3%, 38.3% have an average sized family of

between 8 to 12 persons, 38.3% have a large family size of between 13 to 20 persons and 15% have a very large family which consisted of over 20 persons, Table 6.7.

Large number of persons in one family might seem to be unusual particularly for a nuclear family. The large number of persons in one family could have resulted from farmers marrying more than one wife. Also farmer's children might get married and stay with their parents to form an extended family which consists of wives, children and grandchildren. If the father of the extended family died then he might be replaced by the eldest son who would look after the family. The three types of families, (nuclear, extended under the guardianship of father and the extended family under the guardianship of the eldest son), are discussed in the following section.

About half of the HIGH adopters, 42.9%, in Zone1, had a family size of over 20 persons compared to 21.7% and 0% of the MEDIUM and LOW adopters respectively. None of the HIGH adopters had a family size of less than 8 persons while 8.7% of the MEDIUM adopters and 20% of the LOW adopters had so. In Zone2, 33.3% of the HIGH adopters had a familiy size of over 20 persons compared to none of the MEDIUM and LOW adopters. Also, none of the HIGH and MEDIUM adopters were found to have a family size of less than 8 children, compared to 11.1% of the LOW adopters. So, farmers in both zones look similar in this respect, Table 6.8.

In both zones, a positive and significant association was found between the Adoption Behaviour Scores of farmers and their family size, r=0.4850, and r=0.6355 for Zone1 and Zone2 respectively, Table 6.26. Both results are significant at $p<0.01$. This would suggest that family size was an important factor for the uptake of innovations and improved practices by farmers.

This significant association between family size and the adoption of innovations could not in itself explain whether this relation comes from the availability of labour or from other causes. Therefore, other relationships might be helpful in providing more information. Such relationships between family size and the availability of family labour could be an important consideration. However, the relation between family size and the availability of the family labour showed significant and negative association in both zones,

Table 6.7: The distribution of farmers by the family size (number of person)

Family size	% of farmers in Zone1 + Zone2	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Small (<8 persons)	8.3	10.0	5
Average(8-12)	38.3	35.0	45.0
Large (13-20)	38.3	35.0	45.0
V.large(>20)	15.0	20.0	5.0

V: Very

Table 6.8: The distribution of HIGH, MEDIUM and LOW adopters according to their family size

Family size	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Small (< 8 persons)	0	8.7	20.0	0.0	0.0	11.1
Average (8-12)	14.3	30.4	60.0	33.3	50.0	44.4
Large (13-20)	42.9	39.1	20.0	33.3	50.0	44.4
V.large (> 20)	42.9	21.7	0.0	33.3	0.0	0.0

r=-0.3749 and r=-0.4371 for Zone1 and Zone2 respectively. This would suggest that smaller families tended to rely on family labour more than larger families who rely more on outside labour. In other words, larger families were facing shortages of labour more than smaller families. This could be related to the fact that larger families, who were most likely to be extended families, were found to have a lot of grandchildren whose labour is considered unproductive. The relationship between family size and family type was found to be positively and significantly related, r=0.5606 and r=0.5227 for Zone1 and Zone2 respectively. This initial information has raised the issue that the availability of labour in the family might not be the interpretation of the significant association between family size and the Adoption Behaviour Scores of farmers.

More than half of the farmers, 53.3%, were found to be entirely dependent on their family labour while only 13.3% were found to be dependent completely on outside labour, and 34.4% were found to be dependent on both, Table 6.9.

In Zone1, only 28.6% of the HIGH adopters were found to be fully dependent on their family labour compared to 47.8% and 60% of the MEDIUM and LOW adopters respectively. In Zone2, the majority of the HIGH adopters, 66.7%, were found to be dependent on their family labour compared to 50% and 77.8% of the MEDIUM and LOW adopters respectively, Table 6.10.

In both zones, a negative relation was found between the degree to which labour was available in the family and the Adoption Behaviour Scores of farmers, r=-0.2201 and r=-0.4369 for Zone1 and Zone2 respectively. The degree of association in Zone1 was not significant at p=0.05 while for Zone2 it did reach that level of significancy. This would suggest that labour availability was not an important factor for explaining the adoption behaviour of farmers. This could be related to the nature of the innovations and improved practices included in this study since they were not laborious. This would also suggest that labour might not be the cause for the significant association between family size and the Adoption Behaviour Scores of farmers

This significant association between family size and Adoption Behaviour Scores of farmers could have resulted from other reasons; firstly, a positive

Table 6.9: The distribution of farmers by the level of dependency on their family labour

Level of dependency	% of farmers in both zones (60)	% of farmers in 1st zone (40)	% of farmers in 2nd zone (20)
Outside lab. only	13.3	17.5	5.0
Out lab.>family lab.	16.7	20.0	10.0
Out lab.=family lab.	0.0	0.0	0.0
Out lab.<family lab.	16.7	15.0	20.0
Family lab. only	53.3	47.5	65.0

lab: labour

Table 6.10: The distribution of the HIGH, MEDIUM and LOW adopters according their dependency on their family labour

Level of	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
dependency	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Outside lab. only	14.3	21.7	10.0	33.3	0.0	0.0
Out lab.>family lab.	42.9	17.3	10.0	0.0	25.0	0.0
Out lab.=family lab.	0.0	0.0	0.0	0.0	0.0	0.0
Out lab.<family lab.	14.3	13.0	20.0	0.0	25.0	22.2
Family lab. only	28.6	47.8	60.0	66.7	50.0	77.8

lab: labour

and highly significant association was found between the family size and the farm size, r=0.7227 and r=0.7851 for Zone1 and Zone2 respectively. This would confirm that larger families were found on commercial sized farms which have a strong economic position rather than on small subsistence farms which have a weak economy. So, larger families on larger farms were motivated by the high economic return of their farms and therefore adopted more innovations while smaller families on a subsistence farm had not got that motivation. Secondly, a positive relation was found between the family size and the level of education in the family, r=0.3114 and r=0.1876 for Zone1 and Zone2 respectively. This would suggest that larger families, particularly in Zone1, had more educated members than the smaller families. This may mean that more income was needed by the larger families in order not just to meet the education expenses for their members but also to be able to pay for the hiring labour as a replacement for the cheap family labour. They, therefore, adopted more innovations. Thirdly, family members could play the role of a communicational channel in transmitting the new ideas to their families and make them aware of new things. There is a greater possibility for larger families to have a better communicational channel than smaller ones. This could result from the differences in the quantity and the intellectual ability of their members where the large families had more individuals for making such contacts. They also had a better level of education while small families had less numbers for contact and had a low level of education. Fourthly, in general, large families are counted by farmers as an indication of wealth, power, and prestige. Therefore, farmers with larger families would do whatever is necessary to maintain their families for that reason. This can be supported by that statement which was repeated by some farmers several times. They said: "we would be very happy if our wives gave birth to a baby every day".

6.2.5 Family type

Two types of family, as has been explained above, were found. These were nuclear and extended families. Two family subtypes, under the extended family, were identified, these were the extended family under the guardianship of fathers and the extended family under the eldest sons. The percent-

age of farmers who have a nuclear family was found to be 33.3%, compared to 66.7% of the farmers who have extended families, Table 6.12.

In Zone1, only 14.3% of the HIGH adopters was found to have a nuclear family, compared to 21.7% and 60% of the MEDIUM and LOW adopters respectively. In Zone2, none of the HIGH adopters were found to be living in a nuclear family, compared to half of the MEDIUM adopters and 44.4% of the LOW adopters, Table 6.13.

The above classification for families is an extension of the analysis of the family size and helps in identifying how the decision to adopt innovations was affected by the different types of families. Usually, the nuclear family has less members than the extended family and also the extended family under the guardianship of father has less members than the extended family under the eldest sons. Therefore if the hypothesis about family size is applied, then one can expect that the adoption behaviour of farmers should increase from one group to another, from small to large family.

A family type score was generated as 1, for nuclear, 2 for the extended family under the guardianship of father, and 3, for the extended familiy under the guardianship of the eldest son.

In both zones, a positive relation was found between family type score and the Adoption Behaviour Scores of farmers, r=0.3194 and r=0.3441 for Zone1 and Zone2 respectively. The degree of association, in Zone1 was found to be significant at p=<0.05 while this in Zone2 was not significant. A positive and significant association was found between family type score and family size, r=0.5606 and r=0.5227 for Zone1 and Zone2 respectively. This would confirm that nuclear families have less members than the extended ones. So, the association of family type with the adoption behaviour of farmers could be related back to the effect of the family size. Alternatively the association between family type and adoption behaviour of farmers could be related to the existence of a different type of decision making in different types of family where the wise decision might come from the mature larger family extended family under the eldest son. This will be discussed later, (see 6.2.11).

Table 6.11: The distribution of farmers by level of labour dependency

Level of dependency	% of small family size	% of average family size	% of large family size	% of very large family
Depend on outside lab.	16.7	8.3	4.8	44.4
Outside lab.> f.lab.	16.7	16.7	19.0	11.1
Outside lab.< f.lab.	16.7	12.5	19.0	22.2
Depend on f. lab.	50.0	62.5	57.1	22.2

lab.: labour, f.: family

Table 6.12: The distribution of farmers by their family type

Family type	% of farmers in Zone1 + Zone2	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Nuclear	33.3	30.0	40.0
Extended 1	33.3	42.5	15.0
Extended 2	33.3	27.5	45.0

Extended 1 : Under the guardianship of father, Extended 2 : Under the guardianship of the eldest son

Table 6.13: The distribution of farmers in different groups of adopters according to their family type

Family type	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Nuclear	14.3	21.7	60.0	0.0	50.0	44.4
Extended 1	42.9	52.2	20.0	0.0	12.5	22.2
Extended 2	42.9	26.1	20.0	100.0	37.5	33.3

6.2.6 Level of literacy among farmers

The ability in reading, understanding and writing by farmers was expected to influence their adoption of new technologies or innovations. In fact, innovations nowadays need farmers to be able to read write and understand. Such innovations as fertilizers, herbicides, pesticides and many other innovations cannot be effectively adopted unless they are understood. If they are adopted but not understood then the chance of applying them correctly will be very low and as a consequence this might lead to permanent rejection. Three percent of farmers have rejected the use of fertilizers, not because the fertilizer itself was ineffective but because the farmers did not know which type of fertilizer they had to apply. This was because they were not able to read what had been written on the fertilizer package and they picked up the wrong one, therefore, the result was not satisfactory. These farmers thus gave up the adoption.

Reading and understanding of "Extension" publications or other publications related to agriculture could lead to more adoption and make farmers aware of new technologies. Writing letters to any agricultural organisations might help in getting new ideas and solving problems. About half of the farmers, 45%, were found to be illiterate, 20% can read, understand and write, (which was learnt through informal education)[1] and 35% were educated. The majority of the educated farmers, 62%, have left school at the end of the primary stage, 20% have left at the preparatory stage, 14% have got Bachelor of Science Degrees and 5% have Bachelor of Arts degrees. Since the majority of the educated farmers left school at the primary stage after only elementary education, they were little different from those who were informally educated. In the analysis the sample were treated as literate,

[1] In the past (particularly during the feudal system mandate) very few people could afford formal schooling for their children. If someone decided to educate his children, then he used to send them to a particular person (usually a religious leader) in order to teach them how to read, write and make simple calculations. The only book which was available for reading was "QURAN" (the holy book of Islam). The parents of the children were responsible for the living expense of that person, (the religious leader), by a simple fee paid for teaching their children. A child used to leave that informal school when they became able to read, write and make simple calculations.

55% of the sample, and illiterate, 45% of the sample, Table 6.14.

In Zone1, the percentage of HIGH adopters who were found to be illiterate was 14.3%, compared to 43.5% and 70% of the MEDIUM and LOW adopters respectively. In Zone2, the percentage of HIGH adopters who were illiterate increased to 33.3% while the percentage for the MEDIUM adopters decreased to 25% but for the LOW adopters this percentage was found to be 66.7%, see Table 6.15.

In both zones, a positive association was found between the Adoption Behaviour Scores of farmers and their level of literacy, r=0.3972 and r=0.3259 for Zone1 and Zone2 respectively, Table 6.26. This association, in Zone1, was significant at p=0.01 while the association in Zone2 was not significant at p=0.05. This would emphasise the importance of literacy as a factor affecting the adoption behaviour of farmers in Zone1.

6.2.7 Level of education in the family

The notion here is that farmers are living in families and they are an intergrated part of them. The intellectual ability of their families to a large extent depends on the farmers who are responsible for them. If the family was well educated then this was as a consequence of the individual who was responsible for that family. Farmers who were interested in education and like their children to be educated, have to make considerable sacrifices. They have to sacrifice their cheap labour by sending their children to school, to pay living expenses, rent, clothes, travel, accommodation and so on. All these things together would lead farmers to think carefully about meeting these demands. Innovations could be a better solution for them.

The exposure of the family members to the outside world and their interaction with their parents might help in facilitating the decision making about innovations. The majority of farmers, 61.7%, have an education score from 1 to 6, (see Chapter 4, section 4.5.1), 31.7% have an education score from 7 to 9, only 3.3% have an education score over nine and another 3.3% have no education score at all, see Table 6.16.

In Zone1, the majority of the HIGH adopters, 71.4%, were found to have scores of education from 7 to 9 while 52.2% of the MEDIUM adopters and most of the LOW adopters, 70%, were found to have their scores of

Table 6.14: The distribution of farmers by the level of literacy

Level of literacy	% of farmers in Zone1 +Zone2	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Illiterate	45	45	45
Literate	55	55	55

Table 6.15: The distribution of HIGH, MEDIUM and LOW adopters according to their level of literacy

Literacy	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Illiterate	14.3	43.4	69.6	33.3	25.0	66.7
Literate	85.7	56.5	30.4	66.7	75.0	33.3

education from 1 to 6. In Zone2, the situation is different especially for the HIGH adopters where 66.7% of the HIGH adopters and 87.5% of the MEDIUM and 88.9% of the LOW adopters were found in the group of scores 1 to 6, Table 6.17.

In both zones, a positive association was found between the level of education in the family and the Adoption Behaviour Scores of farmers, r=0.4237 and r=0.2511 for Zone1 and Zone2 respectively. This would suggest that as the level of education increased the adoption of farm innovations followed. In Zone1, the degree of association has reached the level of significancy at $p<0.01$ while it was not significant in Zone2. This would suggest that family education was found to be good as an explanatory factor for uptake of the innovation and improved practices by farmers in Zone1. However this result indicates only the relationships between the two factors and does not indicate the causes and the effects of each factor on the other. Hence it is not clear whether farmers tended to innovate because they had educated families or in order to have an educated family they tended to innovate. However, the following points are of relevance in understanding Syrian farmers. Firstly, farmers might innovate in order to meet the demand of expenditure on education by their family members. This expenditure on education is more likely to come by personal expenditure on food, clothes, rents, books travel etc. rather than on education itself especially under the Syrian condition where the educational system is free in the last stages, intermediate, secondary, universities, and subsidized in the early primary stage. Secondly, as has been discussed above in section 6.2.4, educated family members could play the role of a communicational channel for transferring the new ideas to their parents and might play an important role in the decision making process regarding these new ideas. So, farmers, in this case, were motivated by the intellectual ability of human capital of their family members and as a consequence of this effect tended to innovate

Thirdly, the reputation of the educated family could be an important consideration for the adoption of innovations. Families with more educated members have more prestige than those of low education. Therefore, farmers would do as much as they could in order to facilitate the education of their

Table 6.16: The distribution of farmers by the level of education of their families

Family education score	% of farmers in Zone1 + Zone2	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
0	3.3	5.0	0.0
1 - 6	61.7	50.0	85.0
7 - 9	31.7	40.0	15.0
> 9	3.3	5.0	0.0

Table 6.17: The distribution of HIGH, MEDIUM and LOW adopters according to the level of education in the family

Family education score	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
0	0.0	4.4	10.0	0.0	0.0	0.0
1 - 6	14.3	52.2	70.0	66.7	87.5	88.9
7 - 9	71.4	39.1	20.0	33.3	12.5	11.1
> 9	14.3	4.4	0.0	0.0	0.0	0.0

family members. Also, farmers have been persuaded that education could be a way of gaining a living and more secure jobs for the future of their children.

6.2.8 Years of farming

The idea here is that farmers with less experience in farming might be afraid of taking risk and adopting innovations because they have little knowledge about farming and the consequences of adoption. Therefore, less experienced individuals are expected to lag behind the other farmers who have full experience.

All farmers started growing wheat in the first year of their farming. The majority, 76.7%, have over 20 years of experience in farming, 16.7% from 10-20 years and only 6.7% have less than 10 years, Table 6.18. This would to a large extent, confirm the reliability of using "Sten Scores" as a measure for this type of farmer, (see Chapter 5).

In Zone1, all the HIGH adopters were found to have more than 20 years of experience in farming, compared to 82.6% and 80% of the MEDIUM and LOW adopters respectively. The percentage of the MEDIUM adopters who were found to have less than 10 years in farming was 3% compared to 13% of the LOW adopters. In Zone2, 66.7% of the HIGH adopters have over 20 years in farming compared to 62.5% and 55.6% of the MEDIUM and LOW adopters respectively. This can explain why there is only a slight difference between the three categories of adopters in both zones. Thus, this factor might not be able to differentiate between these three categories of adopters, Table 6.19.

In both zones a weak relation between years spent in farming and hence growing wheat and the Adoption Behaviour Scores of farmers existed, r= 0.2270 and r=0.0533 for Zone1 and Zone2 respectively. Both of these associations were not statistically significant. This would suggest that years spent in farming was not an important factor for understanding the adoption behaviour of farmers. This could be related to the fact that very few farmers, 7%, were found to have less than 10 years in farming while the majority, 77%, have over 20 years.

Table 6.18: The distribution of farmers by years spent in farming

Years of farming	% of farmers in Zone1 + Zone2	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
< 10	6.7	5.0	10.0
10 - 20	16.7	10.0	30.0
> 20	76.7	85.0	60.0

Table 6.19: The distribution of HIGH, MEDIUM and LOW adopters according to years spent in farming

Years of farming	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
< 10	0.0	4.4	10.0	0.0	12.5	11.1
10 - 20	0.0	13.0	10.0	33.3	25.0	33.3
> 20	100.0	82.6	80.0	66.7	62.5	55.6

6.2.9 Residency

The more the farmers are exposed to the outside world the more the possibility exists for them to have more knowledge about innovations. This knowledge plays an important role in affecting the individual decision making process by reducing the tension of risk associated with an innovation. As a consequence this might lead to the adoption of innovations.

Almost half of the sampled farmers, 45%, have resided outside of their village for at least 3 years, most of this residency has taken place for the purposes of military service, Table 6.20.

In Zone1, only 28.6% of the HIGH adopters have resided outside their home villages, compared to 56.5% and 50% of the MEDIUM and LOW adopters respectively. In Zone2 there were no real differences between the HIGH, the MEDIUM and the LOW adopters in relation to their residency outside their home villages, Table 6.21.

In both zones, a negative and very weak relation was found between the Adoption Behaviour Scores of farmers and their residency outside their home villages, r=-0.1278 and r=-0.0366 for Zone1 and Zone2 respectively. This finding is contrary to what was expected. This could be related to the fact that the majority of farmers who lived outside their home villages had joined the army for that period of time. Therefore, most of their time was spent in serving the army and they had nothing to do with agriculture. Those doing military service tended to be the young farmers but some farmers escaped military service as they were not known to Government.

A negative association was found between the residency outside the village and farmers age, r=-0.5260 and r=-0.1805 for Zone1 and Zone2 respectively. This would suggest that farmers who resided outside were younger than those who did not. Age and adoption behaviour of farmers were correlated positively but not significantly, (section 6.2.1).

"Residency" and "years in farming" were found to be correlated negatively and significantly with each other, r=-0.4478 and r=-0.4507 for Zone1 and Zone2 respectively. This would confirm that farmers who resided outside their villages have less years in farming.

Table 6.20: The distribution of farmers by their residency outside their home village

Residency	% of farmers in Zone1 + Zone2	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Resided	45	50	35
Did not reside	55	50	65

Table 6.21: The distribution of HIGH, MEDIUM and LOW adopters according to their residency outside their home villages

Residency	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Resided	28.6	56.5	50.0	66.7	62.5	66.7
Did not reside	71.4	43.5	50.0	33.3	37.5	33.3

6.2.10 Wife's involvement in the decision making process

Women almost equally share responsibility for farming with their husbands and the adoption of some particular innovations included in this study are related to women's involvement in agriculture, (see Chapter 4). It is worth investigating to see how women can affect the decision of their husbands to adopt innovations, if they took part in that decision. It was expected that the more the wives were involved in the decision making process the more likely it was for an innovation to be adopted.

The majority of farmers, 65%, did not involve their wives in the decision making relating to agricultural affairs, 3.3% involved their wives very rarely, 6.7% involved them some times and 25% involved them regularly, Table 6.22. This large percentage of farmers who did not involve their wives in the decision making process could be related to the social system norms and values where a good percentage of individuals believe that a "person who involves his wife in any decision is a weak person".

In Zone1, only 14.3% of the HIGH adopters were found to be involving their wives in the decision related to agriculture, and then only rarely, compared to 26% and 30% of the MEDIUM and LOW adopters respectively. In Zone2, the situation is different where 33.3% of the HIGH adopters were found to be involving their wives, compared to 75% of the MEDIUM adopters and 44.4% of the LOW adopters, Table 6.23.

In both zones a negative association was found between the degree to which farmers wives were involved in the decision making process related to agriculture and the Adoption Behaviour Scores of farmers, r=-0.1959 and r=-0.0929 for Zone1 and Zone2 respectively. Both relationships were found to be not significant at p=0.05. This would suggest that wife involvement in the decision making process was not an important factor for determining the adoption behaviour of farmer. The relationship between the two variables, i.e. Adoption Behaviour Scores of farmers and wife involvement in the decision making process was found to be in an opposite direction to what might be expected. Although not statistically significant, this might give a slight indication that the farmer who involves his wife in the decision making relating to agriculture resulted in a negative effect on the adoption

of innovations. In other words the more the farmers wives were involved in the decision making process about the uptake of innovations the less likely for that innovation to be adopted. This could be related to the fact that first of all, none of the farmers wives included in this study were found to be educated or even literate. Secondly and more importantly, wives might think that the adoption of innovations would lead their husbands to the state of welfare which might lead them to think about marriage again. Therefore, in order for wives to feel secure about their future they have to work to block any innovations. This interpretation could be supported by the fact that a good proportion of wealthy farmers included in this study were found to be married to more than one wife.

It could also be related to the fact that wife may be involved in the decision making process theoretically but not practically. In other words husbands may ask his wife or wives but he would not openly consider their opinion in the process. This could be because of the values and the norms of the social system which consider the man who listened to his wife a weak person. This is reflected in the widely held view "that women should be consulted in any decision but the action taken should be the opposite to the opinion she expresses".

6.2.11 The involvement of the family members in the decision making process

The notion here is to investigate how the collective decision by the family member, including the wife, affects the adoption of innovations. It is generally believed that the wise decision is the collective one not the decision made by oneself. Therefore the more individuals who are involved in the decision making process for the adoption of an innovation the more likely for an innovation to be adopted.

Half of the farmers did not involve any other members of their family in any decision, regarding agriculture, i.e they have taken every decision related to agricultural innovations by themselves only. About forty two per cent shared decisions with just one member of their family, usually a son, wife, brother, sister or relative living with their family, and 8.3% shared decisions with all the family members, Table 6.24.

Table 6.22: The distribution of farmers by their wives involvement in the decision making process about agriculture

Wife involvement in decision	% of farmers in Zone1 + Zone2	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Were not involved	65.0	72.5	45.0
Very rarely involved	3.3	7.5	0.0
Sometimes involved	6.7	2.5	15.0
Always involved	25.0	17.5	40.0

Table 6.23: The distribution of HIGH, MEDIUM and LOW adopters according to the involvement of their wives in the decision making process

Wife involvement	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Were not involved	85.7	73.9	70.0	66.7	25.0	55.6
Very rarely involved	14.3	4.4	0.0	0.0	0.0	0.0
Sometimes involved	0.0	0.0	10.0	0.0	25.0	11.1
Always involved	0.0	21.7	20.0	33.3	50.0	33.3

In Zone1, about half of the HIGH adopters, 42.9%, took their decisions by themselves, compared to 17.4% and 20% of the MEDIUM and LOW adopters respectively. In Zone2, 66.7% of the HIGH adopter farmers took the decision about agriculture by themselves, compared to a quarter of the MEDIUM adopters and 55.6% of the LOW adopters, Table 6.25.

In both zones, a negative but not a significant association was found between the degree to which the other family members were involved in the decision making process relating to agriculture and adoption of innovations. The result might suggest that the collective decision in both zones was not an important factor for explaining the adoption behaviour of farmers.

6.3 Summary and conclusion

Twelve factors under the Personal and Socio Economic factors were studied and discussed in detail. These were age, literacy, years in farming, residency outside the home village, family size, family type, family education, wife's involvement in the decision making process, family members involvement in the decision making process, farm size, fragmentation and dependency on family labour. The results are summarized in table 6.26.

The results, for farmers in Zone1, indicate that four factors out of the twelve selected Personal and Socio Economic factors were found to be related positively to the uptake of the innovations and improved practices. These factors were; family size, family type, farmer's literacy, and level of education of the family. Fragmentation, however, was related significantly but in opposite direction to what was expected, i.e. more fragmentation more uptake of innovations. The rest of the twelve factors did not relate significantly to the Adoption Behaviour Scores of farmers.

The correlation matrix of the twelve factors related to each other shows that about 90% of the inter-relationships among these factors were found to be positive, about 40% inter-related significantly. This would suggest that many of the factors have a part to play in explaining the adoption behaviour of farmers. For example farmers who have better family education are most likely to be literate and have larger families.

In Zone2, only farm size and family size, which both are considered as an indication of wealth, were found to be relating significantly to the Adoption

Table 6.24: The distribution of farmers by the level of involving others in the decision making process

Others involvement in decision	% of farmers in Zone1 + Zone2	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Not shared with anybody	50.0	52.5	45.0
Shared with one member	41.7	35.0	40.0
Shared with all members	8.3	12.5	15.0

Table 6.25: The distribution of HIGH, MEDIUM and LOW adopters according to the level of involving others in the decision making process related to agriculture

Other involvement in decision	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Not shared with anybody	42.9	17.4	20.0	66.7	25.0	55.6
Shared with one member	57.1	69.6	70.0	33.3	50.0	33.3
Shared with all members	0.0	13.0	10.0	0.0	25.0	11.1

Table 6.26: The relation of the Personal and Socio Economic Factors to the Adoption Behaviour Scores of farmers

Personal and Socio Economic factors	Farmers in Zone1 (40)		Farmers in Zone2 (20)	
	Corr. (r)	Level of sig. (p)	Corr. (r)	Level of sig. (p)
Age	0.0876	NS	0.1930	NS
Farm size	0.0946	NS	0.5746	< 0.01
Fragmentation	0.5103	< 0.01	0.4097	NS
Family size	0.4850	< 0.01	0.6355	< 0.01
Family type	0.3194	< 0.05	0.3441	NS
Literacy	0.3972	< 0.01	0.3259	NS
Family education	0.4237	< 0.01	0.2511	Ns
Years of farming	0.2270	NS	0.0533	NS
Residency outside village	-0.1278	NS	0.0366	NS
"Wife's involvement in decision making process"	-0.1959	NS	-0.0929	NS
"Family members involvement in decision making"	-0.0912	NS	0.1327	NS
Dependency on family labour	-0.2201	NS	-0.4369	0.05

Behaviour Scores of farmers. Also, many factors in Zone2 were inter-related and some significantly. This would suggest for example that those farmers who have a large farm have large families and are more dependent on outside labour.

These results have shown some understanding of the adoption behaviour of farmers. The role and influence of the family and education have been highlighted. As importantly the results have thrown light on many fascinating factors in the life of these Syrian farmers, particularly the role of their wife or wives. Table 6.27 sets out a summary of the conclusion drawn.

It is clear that the results for Zone2 provide little opportunity to make conclusions. However for Zone1 there are some clear points emerging.

Table 6.27: Summary of the characteristics of the HIGH, and LOW adopters in relation to Personal and Socio Economic variables.

HIGH adopters	LOW adopters
Zone1	
Have fragmented farms	Have consolidated farms
Have large family	Have small family
Live in extended family	Live in nuclear family
Literate	Illiterate
Have educated family	Have family which is not educated
Zone2	
Third of them have farm size above 50 hectare	None has farm size above 50 hectare
Large family is more dominant	Average and small family are more dominant
Third are dependent completely on outside labour	None was dependent completely on outside labour

CHAPTER 7

The Syrian Farmers Studied:-Economic and Institutional Factors

7.1 Introduction

In the previous chapter some personal and socio-economic characteristics were investigated and analysed in relation to the adoption behaviour scores of farmers. In this chapter the investigation and the analysis are extended to include other issues which might give an insight into the adoption behaviour of farmers. The issues considered fall under six heading: Firstly, the availability of resources on the farm, i.e. what farmers have got on their farm in order to facilitate the adoption of innovations and improved practices. These resources include "land ownership", "type of soil", "type of farm", whether it is an "irrigated" or "a pure rain-fed farm", "machinery and equipment owned", "livestock owned", and "farm road condition". Secondly, the general perception of the accessibility of innovations are examined, i.e. how difficult is it to obtain innovations. More specifically how the accessibility of chemical fertilizers, new seeds, pesticides, herbicides, tractors, sowing machines, spray equipment and transport together affected the adoption behaviour of farmers. Thirdly, the role of "the accessibility of credit". Fourthly, the role of wheat as a cash crop. Fifthly, the general perception of the cost of innovations, i.e. how the cost of chemical fertilizers, new seed, pesticides, herbicides, tractors, sowing machines, spray equipment and transport together affected the adoption behaviour of farmers. Lastly, a study is made of "the perception of the price of wheat".

7.2 Farm Resources

7.2.1 Land Tenure

The notion here is that the farmer who owned his land might be expected to perform better in relation to the adoption of innovations than another farmer who does not own his land. The reason for this could be an economic one, since all the income from innovation would benefit him only. Therefore, this might be an incentive for him to work hard and adopt more than another who shares his land with another person.

Also, sharing properties means sharing decisions as well. When one partner, the person who does not own the land, decides to adopt an innovation, the other decision maker, the owner, might conflict with that decision and prevent the adoption of the innovation.

Farmers who individually own and also rent some land are expected to perform well in the adoption of innovations. The reason for that also could be economic, farmers have to work hard because they pay money in advance for renting land from others. Therefore, this might act as an incentive for them to work hard and use efficient inputs and new technologies. (see Chapter 4, section 4.5.3.6).

Six different groups of land relationships were found. These were "owned land with one owner", 30%, "owned land but shared with more than one owner", 15%, "owned and rented land", 3.3%, "shared land", 10%, "reform land", 30%, and "feudal land", 6.7%, Table 7.1.

In Zone1, more than half of the HIGH adopter farmers, 57.1%, were found to fall under the group of "owned land with only one owner", compared to 21.7% and 40% of the MEDIUM and LOW adopters respectively. In Zone2, none of the HIGH adopters fall under the group of "owned land with only one owner" compared to 25% and 33.3% of the MEDIUM and LOW adopters respectively. However, in Zone2, the majority of the HIGH adopters, 66.7%, were found to fall under a group of "owned land with more than one owner" compared to 25% and 22.2% of the MEDIUM and LOW adopters respectively, Table 7.2.

In both zones the Analysis Of Variance (ANOVA) test did not show any significant differences at p=0.05 amongst the six different groups of land

ownership concerning the Adoption Behaviour Scores of farmers. This would suggest that land ownership was not an important factor for explaining the adoption differences in behaviour of farmers in both zones. This could be related to the fact that there is no predominant group of land ownership, Table 7.3.

7.2.2 Machinery and equipment

The compatibility of innovations and improved practices with the existing machinery and equipment on the farm is of great importance for facilitating the uptake of innovations and improved practices by farmers. Lack of these machines and equipment by farmers could create a greater possibility for rejecting innovations, particularly ones which depend largely on these facilities.

Improved practices and innovations related to wheat depend to a large extent on machinery and equipment, therefore, the availability of these facilities especially on the farm would be of great help to facilitate the adoption of innovations related to wheat.

In Syria, some farmers can afford to buy farm equipment and machinery and the Government helps them in that respect but others could not. This may be due to a lack of capital or the small farm size making possessing of these machines and equipment uneconomic. Therefore, solving this problem particularly for small farmers through some particular organisation would be much appreciated by those farmers. The Government tries to help those farmers who could not afford to possess equipment and machinery through direct intervention by using Government equipment and machinery on farmers' land. Examples include the intervention for controlling weeds and pests in some parts of the country, (see Chapter 5). They may also help in organizing these activities through the cooperative services. Since both forms of intervention, particularly, the last one does not work well, farmers have to rely greatly on hiring machinery and equipment from the private sector, i.e. from other farmers. Since the Government has no direct control on other farmers' machinery and equipment, the owners of them can charge the price they want for letting out their equipment and machinery to other farmers. Also the availability of these machines and equipment is in the

Table 7.1: The distribution of farmers by land ownership

Land ownership	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Owned (one owner)	30.0	22.5	25.0
Owned (> 1 owner)	20.0	15.0	30.0
Owned + rent	3.3	2.5	5.0
Shared	10.0	12.5	5.0
Reform	30.0	27.5	35.0
Feudal	6.7	10.0	0.0

Note: Shared land means that The land owner and the farmer who cultivate the land are sharing the input and the output equally. The labour is fully provided by the farmer.

Table 7.2: The distribution of the HIGH, MEDIUM and LOW adopters according to land ownership

Land ownership	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Owned (one owner)	57.1	21.7	40.0	0.0	25.0	33.3
Owned (> 1 owner)	14.2	17.4	10.0	66.7	25.0	22.2
Owned + rent	0.0	4.4	0.0	0.0	12.5	0.0
Shared	0.0	13.0	20.0	0.0	0.0	11.1
Reform	14.3	30.4	30.0	33.3	37.5	33.3
Feudal	14.3	13.0	0.0	0.0	0.0	0.0
	100	100	100	100	100	100

owner's hand, i.e. it is up to them to decide when to hire out their machines and nobody can exert any influence on them. Under these circumstances, it is expected that farmers who have got their own machinery and equipment on their farms are going to perform better in the adoption of innovations than those who do not.

The majority of farmers, 68.3%, were found to be dependent completely on outside hiring of machinery and equipment for producing their wheat crops. In other words they have neither machinery nor any type of equipment, Table 7.4.

In Zone1 only 14.3% of the HIGH adopters were found to be dependent completely on hiring machinery and equipment from outside, i.e. they have nothing on their farm, compared to 56.5% and 90% of the MEDIUM and LOW adopters respectively. In Zone2, the possession of machinery and equipment is even worse than Zone1. The majority of the HIGH adopters, 66.7%, and most of the MEDIUM adopters, 87.5%, and all the LOW adopters have no equipment nor any type of machinery, Table 7.5.

In both zones, a positive and significant association was found between the total numbers of owned equipment and machinery on the farm and the Adoption Behaviour Scores of farmers, r=0.6053 and r=0.5664 for Zone1 and Zone2 respectively. However, this association between the two variables, Adoption Behaviour Scores of farmers and machinery ownership, does not indicate the causes and the effects of each variable on the other. Therefore one could not be sure whether the availability of machinery on the farm had led farmers to innovate or the adoption of innovations had led to more machinery and so increased the availability of the machinery on the farm. Examining the past data and the nature of the adoptions suggest that it is perhaps the last explanation that is the case.

7.2.3 Livestock

Livestock are considered to be another source of income to the household. However, if livestock are available on the farm they might help farmers in solving some of their financial crises, in other words they increase the farmers credit worthiness. Farmers can sell some of their livestock whenever the capital is needed by them. When the decision comes to adopt an innovation

Table 7.3: The ANOVA test shows the level of difference among different land ownership in relation to the Adoption Behaviour Scores

Groups	Zone1				Zone1			
	No.	Mean	VR	F(P)	No.	Mean	VR	F(P)
Owned (one owner)	13	31.6	0.516	NS	5	10.6	1.471	NS
Owned (> 1 owner)	6	32.5			6	25.2		
Owned + rent	1	30.0			1	22.0		
Shared	5	21.4			1	24.0		
Reform	11	27.1			7	20.9		
Feudal	4	33.3			0	0.0		

The following abbreviations in this Table and in the following tables of this chapter mean; No.:total number of farmers in each group, VR: Variation, F(P): level of significancy.

Table 7.4: The distribution of farmers by their possession of farm equipment and machinery

Total equip. and machinery	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone1 (20)
0	68.3	57.5	90.0
1 to 5	11.7	12.5	10.0
6 to 10	16.7	25.0	0.0
> 10	3.3	5.0	0.0

by farmers then this capital might help to some extent. Therefore, it is expected to see farmers who have livestock on their farm to be in a better position for adoption behaviour than those who do not.

A quarter of farmers were found to be possessing no animals while the majority, 61.7%, were found to be possessing from 0.1 to 5.0 animal units and the rest owned more than five units, Table 7.6,.

In Zone1, the percentage of the HIGH adopters who possessed no animals was found to be 28.6% compared to 21.7% and 30% of the MEDIUM and LOW adopters respectively. In Zone2, 33.3% of the HIGH adopters possessed no animals compared to 37.5% and 11.1% of the MEDIUM and LOW adopters respectively, Table 7.7.

In both zones, a negative and very weak relation was found between the total numbers of animal units owned by farmers and their Adoption Behaviour Scores, r=-0.0221 and r=-0.0971 for farmers in Zone1 and farmers in Zone2 respectively. This is contrary to the suggestion about credit worthiness and could be related to the fact that some farmers did not feel quite comfortable about answering the question which was related to their animal property. This, mainly, was because of the fear of tax payment (see Chapter 4). Therefore, it was felt that farmers' answers relating to the animal property were for some farmers exaggerated downwards. The problem of inaccurate answers was more obvious here because of the complex tax situation and it was felt that in other areas the information given was to a very large extent reliable. If any doubt was raised about answering any question then physical evidence was applied, such as asking to see a piece of equipment, testing reading and writing some material, asking commercial names of some innovations which have been used, the amount of fertilizers used. In fact observations made tended to confirm that the majority of the farmers, 62%, were found to be possessing very few units of animal (0.1 to 5), and thus the answers given were probably close to the truth. In other words possession of livestock did not aid adoption of innovations.

7.2.4 The type of the farm

In general terms, farmers who devoted some parts of their farm land to irrigation or had areas of trees are in a better economic position than those who

Table 7.5: The distribution of HIGH, MEDIUM and LOW adopters according to their possession of farm equipment and machinery

Total equip. and machinery	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
0	14.3	56.5	90.0	66.7	87.5	100.0
1 to 5	0.0	21.7	0.0	33.3	12.5	0.0
6 to 10	71.4	17.4	10.0	0.0	0.0	0.0
> 10	14.3	4.4	0.0	0.0	0.0	0.0

Table 7.6: The distribution of farmers by their possession of animals

Animal units	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
0	25.0	25.0	25.0
0.1 to 5	61.7	55.0	75.0
5.1 to 10	8.3	12.5	0.0
10.1 to 20	3.3	5.0	0.0
> 20	1.7	2.5	0.0

Table 7.7: The distribution of the HIGH, MEDIUM and LOW adopters according to their possession of animals

Animal units	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
0	28.6	21.7	30.0	33.3	37.5	11.1
0.1 to 5	42.9	60.9	50.0	66.7	62.5	88.9
5.1 to 10	14.3	13.0	10.0	0.0	0.0	0.0
10.1 to 20	14.3	0.0	10.0	0.0	0.0	0.0
> 20	0.0	4.4	0.0	0.0	0.0	0.0

do not irrigate or have trees. This economic position might help that category of farmers to adopt more innovations and improved practices related to wheat than those farmers who did not fall in that category.

The majority of farmers, 65%, have not got on their farm land any part devoted for irrigation or trees while 35% have either irrigation or trees, or both, in addition to rain-fed wheat, Table 7.8.

In Zone1, more than half of the HIGH adopters, 57.1%, have not got on their farms any irrigation or trees, compared to 60.9% and 80% of the MEDIUM and LOW adopters respectively. In Zone2, 66.7% of the HIGH adopters have a pure rain-fed farm compared to 25% and 88.9% of the MEDIUM and LOW adopters respectively, Table 7.9.

In both zones, the ANOVA test did not show a significant difference, at p=0.05 between the two types of farms in relation to the Adoption Behaviour Scores of farmers. A very slight indication can be suggested from Table 7.10 that farmers who had mixed farms were slightly better in their adoption behaviour than those who do not. This also might give a weak indication that the adoption of one innovation has led to the adoption of another. As a consequence this contributed to the welfare of the farmers and encouraged them to take risk and adopt more.

7.2.5 Soil type

Farmers who cultivate a poor quality soil might be discouraged by that type of soil to make such investment because of the fear of risking these investments. Therefore, it is expected that farmers who had poor soil would be found as low adopters to innovations and improved practices.

The majority of farmers, 70%, have reported that they have good soil type, 23.3% reported medium soil type and only 6.7% reported a poor soil type on their farms, Table 7.11.

In Zone1, none of the HIGH and MEDIUM adopters reported a poor soil type existed on their farms compared to 10% of the LOW adopters. In Zone2, none of the HIGH adopters reported a poor soil type on their farms compared to 25% and 11.1% of the MEDIUM and LOW adopters respectively, Table 7.12.

In Zone1, a positive and weak relation was found between the degree to

Table 7.8: The distribution of farmers by the type of their farm

Type of the farm	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Purely rainfed	65	65	60
Mixed	35	35	40

Table 7.9: The distribution of the HIGH, MEDIUM and LOW adopters according to the type of their farm

Type of the farm	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Purely rainfed	57.1	60.8	78.3	66.7	25.0	88.9
Mixed	42.9	39.1	21.7	33.3	75.0	11.1

Table 7.10: The ANOVA test shows level of difference among different type of farms in relation to Adoption Behaviour Scores

Groups	Zone1				Zone2			
	No.	Mean	VR	F(P)	No.	Mean	VR	F(P)
Purely rainfed	26	27.5	1.205	NS	12	16.8	2.138	NS
Mixed	14	32.7			8	23.5		

Table 7.11: The distribution of farmers by the soil type on the farm

Soil type	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Poor	6.7	2.5	15.0
Medium	23.3	22.5	25.0
Good	70.0	75.0	60.0

which farms had good soil and the Adoption Behaviour Scores of farmers, r=0.1186 which is not significant at p=0.05. In Zone2, however, a negative association was found between the Adoption Behaviour Scores of farmers and the degree to which the soil was good on the farm, r=-0.1512 but this was not significant at p=0.05. The results in both zones would suggests that soil type of the farm was not an explanatory factor for the adoption behaviour of farmers. This could be related to the fact that only 7% of the farmers were found to have a poor soil type.

7.2.6 Farm road conditions

Farm access roads are considered to be an important resource for farmers like other resources such as soil, water etc. The economic value of the farm land is related significantly to its roads, where the road is good the price of the land is high. One of the most important reasons for this is that there is no problem with physical communication. The poor condition of the road of the farm would be troublesome and an economic problem for farmers, particularly those who have no transportation facilities. Farmers who have difficulties with their farm roads would face a greater difficulty in finding transport and would be charged more for transport. Therefore, farmers who have trouble with their farms access were expected to lag behind the others in relation to the adoption of innovations

Just less than half of the farmers, 48.3%, have reported poor road conditions, "accessible with great difficulties particularly in winter", 23.3% have a good road condition, "paved road", and 28.3% were found in between, "accessible with some difficulties", Table 7.13.

In Zone1, only 14.3% of the HIGH adopters reported a poor road conditions compared to 39.1% and 80% of the MEDIUM and LOW adopters respectively. In Zone2, the situation is different, 66.7% of the HIGH adopters reported a poor road condition compared to half of the MEDIUM adopters and 55.6% of the LOW adopters. (Table 7.14).

A positive relation was found between the degree to which the farm was accessible and the Adoption Behaviour Scores of farmers, r=0.4497 and r=0.2192 for Zone1 and Zone2 respectively. The degree of association in Zone1 was significant at $p<0.01$ while the association in Zone2 was not sig-

Table 7.12: The distribution of the HIGH, MEDIUM and LOW adopters according to the soil type on the farm

Soil type	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Poor	0.0	0.0	10.0	0.0	25.0	11.1
Medium	28.6	21.7	20.0	66.7	25.0	11.1
Good	71.4	78.3	70.0	33.3	50.0	77.8

Table 7.13: The distribution of farmers by their farm road conditions

Farm road condition	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Poor	48.3	45.0	55.0
Medium	28.3	22.5	40.0
Good	23.3	32.5	5.0

Table 7.14: The distribution of the HIGH, MEDIUM and LOW adopters according to their farm road conditions

Farm road condition	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Poor	14.3	39.1	80.0	66.7	50.0	55.6
Medium	28.6	26.1	10.0	0.0	50.0	44.4
Good	57.1	34.8	10.0	33.3	0.0	0.0

nificant even at p=0.05. This would suggest that for Zone1 the accessibility of the farm road was a factor in the adoption behaviour of farmers. It should be remembered that in Zone1, there was more innovation of higher technologies eg. use of sprayers, for these good roads may be more critical than, for example, the use of new varieties.

7.3 The general perception of the accessibility of innovations

This aspect involves the access to chemical fertilizers, new seeds, herbicides, pesticides, tractors, sowing machines, spray equipment and transport.

The prime provider of the eight innovations is the Government. Farmers can either obtain them from the Government through its institutes or from the private sector. Some of these innovations are produced locally and some are imported. The requirements of farmers for these innovations are still not fulfiled and they are far from the optimum. Therefore, farmers might face difficulties in obtaining these innovations which in turn might affect their adoption behaviour.

Reference is made to Table 7.15, in general terms 55.8% of the farmers reported "difficulties in obtaining the eight innovations" and 32.9% reported "no difficulties at all" and 11.2% were found in between.

With reference to Table 7.16, in general terms, 30.3% of the HIGH adopters in Zone1 reported "difficulties in obtaining the eight innovations" compared to 53.2% and 68.7% of the MEDIUM and LOW adopters respectively. In Zone2, however, in general terms, 54.1% of the HIGH adopters reported "difficulties in obtaining the eight innovations" compared to 62.5% of the MEDIUM adopters and 62.5% of the LOW adopters.

In both zones, a positive association was found between the perceived level of ease in getting the eight innovations and the Adoption Behaviour Scores of farmers, r=0.3666 and r=0.0831 for Zone1 and Zone2 respectively. The degree of association in Zone1 was significant at $p<0.05$ while this in Zone2 was not significant. This would suggest the importance of the ease of the access for the adoption of innovations and improved practices in Zone1.

Table 7.15: The distribution of farmers by the perceived level of access to innovations

Innovation	Level of access	Zone1+2 (60)		Zone1 (40)		Zone2 (20)	
		No.	%	No.	%	No.	%
Fertilizers	Easy	10	16.7	10	25	0	0.0
	Medium	17	28.3	9	22.5	8	40.0
	Difficult	33	55.0	21	52.5	12	60.0
New seeds	Easy	22	36.7	14	35	8	40.0
	Medium	9	15.0	6	15	3	15.0
	Difficult	29	48.3	20	50	9	45.0
Herbicides	Easy	24	40.0	14	35	10	50.0
	Medium	5	8.3	5	12.5	0	0.0
	Difficult	31	51.7	21	52.5	10	50.0
Pesticides	Easy	24	40.0	14	35	10	50.0
	Medium	4	6.7	4	10	0	0.0
	Difficult	32	53.3	22	55	10	50.0
Tractors	Easy	24	40.0	19	47.5	5	25.0
	Medium	1	1.7	0	0.0	1	5.0
	Difficult	35	58.3	21	52.5	14	70.0
Sowing	Easy	24	40.0	19	47.5	5	25.0
machine	Medium	1	1.7	0	0.0	1	5.0
	Difficult	35	58.3	21	52.5	14	70.0
Sprayer	Easy	20	33.3	15	37.5	5	25.0
	Medium	5	8.3	3	7.5	2	10.0
	Difficult	35	58.3	22	55.0	13	65.0
Transport	Easy	10	16.7	9	22.5	1	5.0
	Medium	12	20.0	9	22.5	3	15.0
	Difficult	38	63.3	22	55.0	16	80.0
Total	Easy	158	32.9	114	35.6	44	27.5
	Medium	54	11.2	36	11.2	18	11.2
	Difficult	268	55.8	170	53.1	98	61.2

Table 7.16: The distribution of HIGH, MEDIUM and LOW adopters by the perceived level of access to innovations in Zone1

Innovations		HIGH ADOPTERS			MEDIUM ADOPTERS			LOW ADOPTERS		
		Easy	Med.	Dif.	Easy	Med.	Dif.	Easy	Med.	Dif
Fertilizer	No.	3	2	2	7	6	10	0	1	9
	%	42.9	28.6	28.6	30.4	26.1	43.4	0.0	10.0	90.0
New seeds	No.	2	2	3	10	2	11	2	2	6
	%	28.6	28.6	42.9	43.5	8.7	47.8	20.0	20.0	60.0
Herbicides	No.	4	0	3	7	4	12	3	1	6
	%	57.1	0.0	42.9	30.4	17.4	52.2	30.0	10.0	60.0
Pesticides	No.	4	0	3	7	3	13	3	1	6
	%	57.1	0.0	42.9	30.4	13.0	56.5	30.0	10.0	60.0
Tractors	No.	5	0	2	11	0	12	3	0	7
	%	71.4	0.0	28.6	47.8	0.0	52.2	30.0	0.0	70.0
Sowing machine	No.	5	0	2	11	0	12	3	0	7
	%	71.4	0.0	28.6	47.8	0.0	52.2	30.0	0.0	70.0
Sprayer	No.	5	1	1	6	1	16	4	1	5
	%	71.0	14.3	14.3	26.1	4.3	69.6	40.0	10.0	50.0
Transport	No.	4	2	1	5	6	12	0	1	9
	%	57.1	28.6	14.3	21.7	26.1	52.2	0.0	10.0	90.0
Total	No.	32	7	17	64	22	98	18	7	55
	%	57.1	12.5	30.3	34.8	11.9	53.2	22.5	8.7	68.7

Med: medium, Dif: Difficult

Table 7.17: The distribution of HIGH, MEDIUM and LOW adopters by the perceived level of access to innovations in Zone2

Innovations		HIGH ADOPTERS			MEDIUM ADOPTERS			LOW ADOPTERS		
		Easy	Med.	Dif.	Easy	Med.	Dif.	Easy	Med.	Dif
Ferti-										
lizer	No.	0	2	1	0	3	5	0	3	6
	%	0.0	66.7	33.3	0.0	37.5	62.5	0.0	33.3	66.7
New										
seeds	No.	0	0	3	4	2	2	4	1	4
	%	0.0	0.0	100.0	50.0	25.0	25.0	44.4	11.1	44.4
Herbi-										
cides	No.	2	0	1	3	0	5	5	0	4
	%	66.7	0.0	33.3	37.5	0.0	62.5	55.6	0.0	44.4
Pesti-										
cides	No.	2	0	1	3	0	5	5	0	4
	%	66.7	0.0	33.3	37.5	0.0	62.5	55.6	0.0	44.4
Tractor	No.	1	0	2	1	1	6	3	0	6
	%	33.3	0.0	66.7	12.5	12.5	75.0	33.3	0.0	66.7
Sowing	No.	1	0	2	1	1	6	3	0	6
machine	%	33.3	0.0	66.7	12.5	12.5	75.0	33.3	0.0	66.7
Sprayer	No.	1	0	2	4	0	4	0	2	7
	%	33.3	0.0	66.7	50.0	0.0	50.0	0.0	22.2	77.8
Transport	No.	0	2	1	1	0	7	0	1	8
	%	0.0	66.7	33.3	12.5	0.0	87.5	0.0	11.1	88.9
Total	No.	7	4	13	17	7	40	20	7	45
	%	29.1	16.7	54.1	26.5	10.9	62.5	27.7	9.7	62.5

Med. Medium, Dif: Difficult

7.3.1 Access to credit

The cash flow from rain-fed farming is not continuous throughout the year like irrigated farming. Farmers may have cash from selling their rain-fed crops at the end of the growing season and then they have to wait until the next year at the same time. Farmers, particularly those who have no other sources of income but the income from rain-fed farming, may suffer tremendously from the lack of capital at the planting season. It is more likely for farmers who depend entirely on rain-fed income to face this kind of capital crisis since there is a long period of time between harvesting season and planting season (4-6 months). In a case like this, the availability of credit would be appreciated in order to solve farmers' capital deficit. Therefore, any difficulty in finding and getting credit might lead to low spending and farmers being compelled to follow a traditional method of farming.

The majority of farmers, 73%, did not get any type of credit at all, 22% had short term loans, (cash or kind, mainly for buying or hiring inputs such as fertilizers, new seeds, cultivation and so on) and 5% had medium term loans for buying different materials. However, only 29% of the cooperative members were found to get short term loans, (cash or kind), 7% had medium term loans and the majority, 64%, did not get any. This would suggest that most of the members are joining the cooperative to obtain better services rather than for obtaining credit, Table 7.18.

The most important reasons which were reported by farmers for not getting credit were found to be; "afraid of not being able to pay it back, i.e. I am not a risk taker", "do not like to pay an interest rate because of religious reasons", "no need for it because money is available to me", "difficult to get credit" and "would like to be free from agricultural plan and from others".

However, even farmers who had cash available reported that if they need credit in the future they would not like to have it, the main reason for this they said was "we don't like to be in debt and be controlled by others". This would suggest that the availability of credit to some farmers would not solve their problem of the cash shortage, unless some action can be taken. Credit subsidies in some bad years and reducing the interest rate and freeing farmers from any imposed condition, see Chapter 2, are likely to

be the first priority for encouraging farmers to get credit which might lead to the improvement in their adoption behaviour.

In order to investigate the effect of the credit and own cash availability by farmers on their adoption behaviour farmers were divided into three groups. Group A consists of farmers who get credit, group B includes farmers who did not get credit but they said there was no need for it because they have their own money, and group C consists of the rest of the farmers, i.e. farmers who did not get credit and who have a problem in getting it.

In both zones, the ANOVA test showed significant differences at $p<0.001$ and $p=0.05$ for Zone1 and Zone2 respectively among the three groups of farmers (A, B and C) in relation to the Adoption Behaviour Scores of farmers. In both zones, the highest Adoption Behaviour Scores was found with group B of farmers who did not need the credit because of the availability of cash for them, this was followed by group A who had credit and the lowest scores was found with group C who found difficulties in getting credit, Table 7.20. This would suggest the importance of the availability of the farmer's own money in order to adopt more innovation. This result agrees with farmers' statements when they reported their reasons for not using chemical fertilizers, they said: "even if the chemical fertilizers were introduced to us by credit we would not use it because the credit has to be paid back and we are not sure about paying it back. We will use chemical fertilizers when we have our own money. If we lose then we lose the money from our own pocket and nobody is coming to us and ask to pay pack the credit".

In Zone1, the Least Significant Differences test (LSD) showed significant differences at $p<0.001$ between farmers in group B who did not get credit because they had enough money and those who did not get credit because they found difficulties in getting it, group C, in relation to the Adoption Behaviour Scores. Also there were significant differences at $p<0.05$ between farmers in group C and farmers in group A. But there were no significant differences between group A and group B. This would suggest the importance of credit in helping farmers adopt innovations, i.e. credit would solve the problem of adoption if it was taken by farmers.

It can be concluded that the lack of the availability of their own cash and

the fear of taking a risk by borrowing money combined with some difficulties in obtaining the credit was a severe constraint in the adoption of innovations by the rain-fed farmers.

7.4 Wheat as a cash crop

Of course farmers who grow wheat for market are going to look after their crops more than those who grow it for their own consumption. This is because their investments in their crops will be recovered and paid back as well as to making some profit, while farmers who consume their products would have no cash payment. Therefore farmers who consume their products of wheat are expected to lag behind those who grow wheat for market.

The majority of farmers, 73.3%, were found to be selling their wheat to the private or public sector, most of them sell to the public sector. Twenty seven percent did not sell their wheat either to the public or private sector, i.e. they used all their production for their own consumption, Table 7.21.

In Zone1, 14.2% of the HIGH adopters were found to be consuming all their production of wheat compared to 13% and 50% of the MEDIUM and LOW adopters respectively. In Zone2, none of the HIGH adopters were found to be consuming all their production of wheat compared to 25% and 55.6% of the MEDIUM and LOW adopters respectively, Table 7.22.

The ANOVA test in Zone1 showed significant differences between farmers who sell their products of wheat and those who consumed all of their production, in relation to the Adoption Behaviour Scores of farmers. But, in Zone2, the ANOVA test did not show any significant difference between farmers who consumed their production and those who sell it, Table 7.23. This would suggest the importance of this factor as an explanatory factor for the adoption behaviour of farmers in Zone1 but not in Zone2. Again it should be remembered Zone2 is less agriculturally developed. Or it could be that innovations might encouraged farme rs to switch from subsistence agriculture to commercial one.

Marketing the products is also an important aspect of farming. If the market is available or easy to find then this would be much appreciated by farmers. In Syria, however, marketing can be done through Government intervention or by farmers themselves. More specifically, marketing of wheat products nowadays has become the entire responsibility of the Government. Therefore, if there is any difficulty in marketing by farmers it is more likely

Table 7.18: The distribution of farmers by type of credit

Type of	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Did not get	73.0	72.5	75.0
Short term loan	22.0	22.5	20.0
Medium term loan	5.0	5.0	5.0
Long term loan	0.0	0.0	0.0

Table 7.19: The distribution of farmers by their reasons for not getting credit

Reasons	Yes		No		Rank
	No.	%	No.	%	
"Afraid of not being able to pay it back"	18	41	26	59	1
"Do not like to pay interest"	16	36	28	64	2
"No need for it"	16	36	28	64	2
"To be free of others"	13	29	31	70	4
"Difficult to get it"	10	23	34	77	5
"Land too small"	2	5	42	95	6
"Tried but I could not get"	2	5	42	95	6
"Land property not registered"	1	2	43	98	8

Table 7.20: The ANOVA test shows the level of difference among farmers who get credit and those who did not, in relation to Adoption Behaviour Scores

Groups	Zone1				Zone2			
	No.	Mean	VR	F(P)	No.	Mean	VR	F(P)
(Group A)	11	31.2	12.023	< 0.001	5	18.4	3.586	0.05
(Group B)	13	40.0			4	30.3		
(Group C)	16	19.4			11	16.1		

Table 7.21: The distribution of farmers according to their sales of wheat

	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Did not sell	26.7	22.5	35.0
Sell	73.3	77.5	65.0

Table 7.22: The distribution of HIGH, MEDIUM and LOW adopters according to their sales of wheat

	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Did not sell	14.2	13.0	50.0	0.0	25.0	55.6
Sell	85.7	86.9	50.0	100.0	75.0	44.4

Table 7.23: The ANOVA test shows the level of difference among farmers who sell their products and those who did not, in relation to Adoption Behaviour Scores

Groups	Zone1				Zone2			
	No.	Mean	VR	F(P)	No.	Mean	VR	F(P)
Did not sell	9	19.8	5.886	<0.05	7	13.7	3.936	NS
Sell	31	32.1			13	22.6		

to come from the delay in taking the products from them or delay in payment rather than from an availability in finding a place to sell the wheat.

More than half of the farmers, 56%, who did not sell their wheat reported that it was easy for them to find a market to sell their product of wheat if they would have any surplus, while 44% reported difficulties. In comparison, 77% of the farmers who sell their production of wheat reported that it was easy for them to find a market to sell their products while only 23% reported difficulties, Table 7.24.

In Zone1, none of the HIGH adopters who sell their production were found to be facing any difficulties compared to 20% and 60% of the MEDIUM and LOW adopters respectively. Also, none of HIGH adopters who did not sell their products were found to be facing any difficulties if they wanted to sell their production compared to 33% and 20% of the MEDIUM and LOW adopters respectively, Table 7.25. In Zone2, 33% of the HIGH adopters who sell their production reported difficulties in selling compared to 0% and 5% of the MEDIUM and LOW adopters respectively. Half of the MEDIUM adopters who did not sell their production reported difficulties in selling as did 80% of the LOW adopters, Table 7.25.

In Zone1, the ANOVA test showed no significant differences, at p=0.05, among four different groups of farmers in relation to the Adoption Behaviour Scores. The four groups were; (A) farmers who did not sell their production of wheat and found the access to market difficult, (B) farmers who did not sell their production but perceive the access to market as easy, (C) farmers who sell their production and found the access to market difficult, and (D) farmers who sell their production and found the access to market easy. The mean Adoption Behaviour Scores which were found for the four groups were 14.5, 21.3, 25.7 and 34.0 for the groups A, B, C, and D respectively. In Zone2, the ANOVA test did not show any significant differences among the four groups A, B, C, and D, Table 7.26. This could be related to the fact that most of the farmers including LOW adopters perceived the ease of the access to market, Table 7.26.

Table 7.24: The distribution of farmers according to their perception of the access to the market

	Zone1 + Zone2		Zone1		Zone2	
	No.	%	No.	%	No.	%
A	7	44	2	22	5	71
B	9	56	7	78	2	29
C	10	23	7	23	3	23
D	34	77	24	77	10	77

A: did not sell and perceive difficulty in selling, B: did not sell and perceive ease in selling, C: sell wheat and find difficulty in selling it, D: sell wheat and perceive ease in selling it

Table 7.25: The distribution of HIGH, MEDIUM and LOW adopters according to their perception of the access to the market

	Zone1 (40)						Zone2 (20)					
	H (7)		M (23)		L (10)		H (3)		M (8)		L (9)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No	%
A	0	0	1	33	1	20	0	0	1	50	4	80
B	1	100	2	67	4	80	0	0	1	50	1	20
C	0	0	4	20	3	60	1	33	0	0	2	50
D	6	100	16	80	2	40	2	67	6	100	2	50

A: did not sell and perceive difficulty in selling, B: did not sell and perceive ease in selling, C: sell wheat and find difficulty in selling it, D: sell wheat and perceive ease in selling it

7.5 Access to Agricultural Extension service

The majority of farmers, 67%, had neither visited Extension wokers nor had been visited by them, while 33% of the farmers did have personal contact. This will be discussed in more detail in Chapter 8.

The majority of farmers, 60%, who had no contact with the Extension worker reported that there was no difficulty for them to contact the Extension workers if they wanted to, Group BB. Forty per cent reported difficulties mainly because of transport problems, Group AA. In comparison, 90% of the farmers who contacted the Extension reported that it was easy for them to contact, Group DD, while only 10% reported difficulty, Group CC, Table 7.27.

In Zone1, none of the HIGH adopters who have contact with Extension faced any difficulties in that contact compared to 20% and 100% of the MEDIUM and LOW adopters respectively. For those who have no contact with Extension, 44.4% of the MEDIUM adopters perceived that there are difficulties in contact compared to 33.3% of the LOW adopters. In Zone2, none of the HIGH, MEDIUM, or LOW, adopters who have contact with Extension reported any difficulties in that contact. Also, none of the HIGH and MEDIUM adopters who did not have contact perceived any difficulties in contacting Extension worker compared to 62.5% of the LOW adopters, Table 7.28.

In Zone1, the ANOVA test showed significant differences at $p<0.001$ among the four groups of farmers (AA, BB, CC, and DD) in relation to the Adoption Behaviour Scores. In Zone2, the ANOVA test did not show any significant differences between the four groups of farmers in relation to the Adoption Behaviour Scores, Table 7.29.

For farmers in Zone1 only, the Least Significant Differences (LSD) test showed significant differences at $p<0.01$ between Group DD on the one side and all of Group AA, Group BB and Group CC on the other side in relation to the Adoption Behaviour Scores of farmers. There were no significant differences between Group AA and Group BB , Group AA and Group CC in relation to the Adoption Behaviour Scores of farmers. This result would suggest that improving the access to Extension might be useful.

Table 7.26: The ANOVA test shows the level of difference among farmers who perceive the access to market as a difficult one and those who did not, in relation to the Adoption Behaviour Scores

Groups	Zone1				Zone2			
	No.	Mean	VR	F(P)	No.	Mean	VR	F(P)
A	2	14.5	2.816	0.053	5	13.2	1.231	NS
B	7	21.3			2	15.0		
C	7	25.7			3	24.3		
D	24	34.0			10	22.1		

A: did not sell and perceive difficulty in selling, B: did not sell and perceive ease in selling, C: sell wheat and find difficulty in selling it, D: sell wheat and perceive ease in selling it

Table 7.27: The distribution of farmers by their perception of the access to Extension

Contact	Perception	Zone1 + Zone2		Zone1		Zone2	
		No.	%	No.	%	No.	%
Had no contact	Difficult (Group AA)	16	40	11	40	5	38
	Easy (Group BB)	24	60	16	59	8	62
Had contact	Difficult (Group CC)	2	10	2	15	0	0
	Easy (Group DD)	18	90	11	85	7	100

Table 7.28: The distribution of HIGH, MEDIUM and LOW adopters by their perception of the access to Extension

		Zone1 (40)						Zone2 (20)					
		H (7)		M (23)		L (10)		H (3)		M (8)		L (9)	
		No.	%	No.	%	No.	%	No.	%	No.	%	No	%
Had	D1												
no		0.0	0.0	8.0	44.0	3.0	33.0	0.0	0.0	0.0	0.0	5.0	62.5
con.	E1												
		0.0	0.0	10.0	55.6	6.0	66.7	1.0	100.0	4.0	100.0	3.0	37.5
had	D2												
		0.0	0.0	1.0	20.0	1.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
con.	E2												
		7.0	100.0	4.0	80.0	0.0	0.0	2.0	100.0	4.0	100.0	1.0	100.0

D1: Difficult Group AA, E1: Easy Group BB, D2: Difficult Group CC, E2: Easy Group DD, con. contact.

7.6 The general perception of the cost of innovations

This involves the cost of chemical fertilizers, new seeds, hiring tractors, pesticides, herbicides, hiring sowing machine, spray equipment and hiring transport.

With reference to Table 7.30, in general terms just above half of the farmers, 51.9%, perceived that the cost of hiring or buying the eight mentioned innovations was "expensive", 34.9% perceived them as "cheap" and 13.3% were found in between.

Reference is made to Table 7.31, in general terms, 67.8% of the HIGH adopters in Zone1 perceived the innovations were "not costly", i.e. cheap, compared to 40.2% and 11.2% of the MEDIUM and LOW adopters respectively. In Zone2, 37.5% of the HIGH adopters and also another 37.5% of the MEDIUM adopters perceived the innovations as "not costly" compared to only 18.1% of the LOW adopters, Table 7.32.

In both zones, a highly positive and significant association was found between the total perception of the cost of the eight innovations and the Adoption Behaviour Scores of farmers, r=0.7444 and r=0.4830 for Zone1 and Zone2 respectively. This would suggest the importance of the perceived cost of the innovations as a possible explanatory factor for the adoption behaviour of farmers for innovations and improved practices.

7.7 The perception of the price for wheat

As has been reported earlier in this Chapter, 27% of the farmers did not sell their production of wheat while 73% were found to be selling their production. Only 31% of the farmers who did not sell their wheat have reported that the price of wheat was "low", Group AAA, while 69% reported that the price was "fair", Group BBB. In comparison, 61% of the farmers who sell their production of wheat reported that the price was "low", Group CCC, while 39% reported that the price was "fair", group DDD, Table 7.33. This would suggest that the majority of farmers who sell their wheat were "not happy with the price" of wheat while the majority of farmers who consumed their products of wheat were found to be "happy with the price if they sold it". This might give an indication that farmers who consumed their wheat might need to buy more wheat grain to consume because their

production is not enough to satisfy their requirements and in buying the wheat they find it "expensive". They thus think selling wheat would be possible and financially rewarding.

In Zone1, 33% of the HIGH adopters who sell their production of wheat reported that the price of wheat was "low" compared to 70% and 60% of the MEDIUM and LOW adopters respectively. All the HIGH adopters who did not sell their production of wheat reported a "low" price compared to none of the MEDIUM and LOW adopters, Table 7.38. In Zone2, 67% of the HIGH adopters who sell their production of wheat reported the "low" price compared to 67% of the MEDIUM adopters and 50% of the LOW adopters. Half of the MEDIUM adopters who consumed their production reported a "low" price compared to none of the LOW adopters, Table 7.34.

In both zones, the ANOVA test did not show a significant difference at p=0.05 among the four different groups of farmers AAA, BBB, CCC and DDD in relation to the Adoption Behaviour Scores of farmers. This would suggest that the perception of the price of wheat was not an explanatory factor for the adoption behaviour of farmers, Table 7.35.

7.8 Summary and Conclusion

Twelve economic and institutional factors were analysed and discussed in this chapter. These were "land ownership", "livestock", "farm machinery and equipment", "farm soil type", "farm type", "farm road condition", "the accessibility of the credit and the availability of cash money", "wheat as a cash crop", "the perception of the price of wheat", "the general perception of the accessibility of innovations", "the general perception of the cost of innovations", and "the accessibility of Extension". Table 7.36 summarizes the results.

In Zone1, seven factors out of eleven were found to be relating significantly to the Adoption Behaviour Scores of farmers. These were "farm machinery and equipment", "farm road condition", "accessibility of credit and the availability of cash money for farmer", "wheat as a cash crop", "general perception of the accessibility of innovations", the "general perception of the cost of innovations", and "the accessibility of Extension".

In Zone2, only "farm machinery and equipment", the "general perception

of the cost of innovations" and "the accessibility of credit and the availability of cash" were found to be relating significantly to the Adoption Behaviour Scores of farmers.

In both zones, the lack of their own cash by farmers associated with the fear of risking credit were found to be the most crucial factors for determining the lack of adoption behaviour of farmers.

In Zone1 particularly availability of credit seemed to play an important role in making farmers innovate and this could be as a replacement for the farm resource. Therefore most of the related farm resources such as livestock and farm type seemed not to be important for the adoption behaviour.

In Zone1, 93% of the inter-relationships among the related factors of the Economic and Institutional factors were found to be positive and the majority of these inter-relationships, 71%, were found to be significant. For example "machinery and equipment" related positively and significantly with "farm road condition", "credit and the availability of cash", "general perception of the accessibility of innovations" and "general perception of the cost of the innovations". Also, "general perception of the cost of innovations" was found to relate positively and significantly with "farm road conditions", "credit and availability of cash" and "general perception of the access of the innovations" and so on (see Appendix C). This would suggest that farmers who have problem with machinery, i.e. they lack machinery, were most likely to have poor road conditions, to have a problem of lack of own cash, to have difficulties with the accessibility of innovations and feel that the price of innovations are very high.

In Zone2 although all the inter-relationships of the related factors of the Economic and Institutional factors were found to be positive, none of them were found to inter-relate significantly. This would suggest the diversity of the problems among farmers in this zone and this would necessitate solutions for all the related variables.

Concerning the relationships between Economic and Institutional factors and the relevant factors of the Personal and Socio-Economic aspects in Zone1, all the relationships were found to be positive while only 37% of them were found to be significant. The most distinctive relations were

found between the "general perception of the cost of the innovations" and "farm road conditions" on the one side and all of the Personal and Socio-Economic factors on the other side. Both related significantly with all the relevant factors of the Personal and Socio-economic factors. "Family size", "family type" and "farmers' literacy" of the Personal and Socio-Economic factors were related with many of the Economic and Institutional factors. This would suggest the importance of the Economic and Institutional factors for the outcome of the decision making process, in addition to the Social factors.

In Zone2 the relationships between the relevant factors of the Economic and Institutional factors on the one hand and the related factors of the Personal and Socio-Economic factors on the other hand all were found to be positive and the majority of them were significant but rather low (see Appendix C). "Machinery and equipment", "general perception of the cost of innovations" and "credit and the availability of cash" of the Economic and Institutional factors were found to relate with 100%, 67% and 33% of the Personal and Socio-Economic factors. "Farm size", "dependency on outside labour" and "family size" of the Personal and Socio Economic factors were found to relate with 67% of the Economic and Institutional factors. This again would suggest the importance of Economic and Institutional factors in addition to Social factors, and this would also give an indication that farmers, for example, who have a better economic position were most likely to have better social characteristics affecting adoption.

Table 7.37 builds up the picture of the type of farmers started in Chapter 6.

Table 7.29: The ANOVA test shows the level of difference among farmers who perceive the access to Extension as an easy one and those who perceive it as difficult one in relation to the Adoption Behaviour Scores

Contact	Perception	Zone1				Zone2			
		No.	Mean	VR	F(P)	No.	Mean	VR	F(P)
Had no	Diff.(AA)	11	26.6	12.967	< 0.001	5	10.6	3.276	NS
contact	Easy (BB)	16	23.3		8	21.1			
Had	Diff.(CC)	2	24.0		-	-			
contact	Easy (DD)	11	45.8		7	24.0			

Diff: Difficult Group.

Table 7.30: The distribution of farmers by their perception of the cost of the innovations

Innovation	perception	Zone1+2 (60)		Zone1 (40)		Zone2 (20)	
		No.	%	No.	%	No.	%
Fertilizers	Cheap	16	26.7	13	32.5	3	15.0
	Medium	20	33.3	13	32.5	7	35.0
	Expensive	24	40	14	35.0	10	50.0
New seeds	Cheap	26	43.3	17	42.5	9	45.0
	Medium	11	18.3	8	20.0	3	15.0
	Expensive	23	38.3	15	37.5	8	40.0
Herbicides	Cheap	27	45.0	17	42.5	10	50.0
	Medium	4	6.7	4	10.0	0	0.0
	Expensive	29	48.3	19	47.5	10	50.0
Pesticides	Cheap	19	31.7	11	27.5	8	40.0
	Medium	6	10.0	5	12.5	1	5.0
	Expensive	35	58.3	24	60.0	11	55.0
Tractors	Cheap	16	26.7	15	37.5	1	5.0
	Medium	5	8.3	4	10.0	1	5.0
	Expensive	39	65.0	21	52.5	18	90.0
Sowing	Cheap	27	45.0	19	47.5	8	40.0
machine	Medium	11	18.3	7	17.5	4	20.0
	Expensive	22	36.7	14	35.0	8	40.0
Sprayer	Cheap	22	36.7	17	42.5	5	25.0
	Medium	3	5.0	2	5.0	1	5.0
	Expensive	35	58.3	21	52.5	14	70.0
Transport	Cheap	14	23.3	12	30.0	2	10.0
	Medium	4	6.7	3	7.5	1	5.0
	Expensive	42	70.0	25	62.5	17	85.0
Total	Cheap	167	34.9	121	37.8	46	28.7
	Medium	64	13.3	46	14.3	18	11.3
	Expensive	249	51.9	153	47.8	96	60.0

Table 7.31: The distribution of HIGH, MEDIUM and LOW adopter by their perception of the cost of the innovations in Zone1

Innovations		HIGH ADOPTERS			MEDIUM ADOPTERS			LOW ADOPTERS		
		Che.	Med.	Exp.	Che.	Med.	Exp.	Che.	Med.	Exp.
Ferti-										
lizer	No.	6	1	0	7	10	6	0	2	8
	%	85.7	14.2	0.0	30.0	43.3	26.0	0	20	80
New seeds	No.	3	3	1	12	4	7	2	1	7
	%	42.9	42.9	14.2	52.1	17.3	30.4	20	10	70
Herbi-										
cides	No.	5	1	1	11	0	12	1	3	6
	%	71.4	14.2	14.2	47.8	0.0	52.1	10	30	60
Pesti-										
cides	No.	3	1	3	8	2	13	0	2	8
	%	42.9	14.2	42.9	34.7	8.7	56.5	0	20	80
Tractors	No.	5	1	1	10	3	10	0	0	10
	%	71.4	14.2	14.2	43.2	13.0	43.4	0	0	100
Sowing	No.	5	1	1	11	4	8	3	2	5
machine	%	71.4	14.2	14.2	47.8	17.3	34.7	30	20	50
Sprayer	No.	7	0	0	7	2	14	3	0	7
	%	100.0	0.0	0.0	30.4	8.7	60.8	30	0	70
Transport	No.	4	1	2	8	2	13	0	0	10
	%	57.1	14.2	28.6	34.7	8.7	56.5	0	0	100
Total	No.	38	9	9	74	27	83	9	10	61
	%	67.8	16.1	16.1	40.2	14.7	45.1	11	13	76

Che: Cheap, Med: Medium, Exp: Expensive

Table 7.32: The distribution of HIGH, MEDIUM and LOW adopter by their perception of the cost of the innovations in Zone1

Innovations		HIGH ADOPTERS			MEDIUM ADOPTERS			LOW ADOPTERS		
		Che.	Med.	Exp.	Che.	Med.	Exp.	Che.	Med.	Exp.
Ferti-										
lizer	No.	2	1	0	1	4	3	0	2	7
	%	66.7	33.3	0.0	12.5	50.0	37.5	0.0	22.2	77.8
New										
seeds	No.	2	0	1	6	0	2	1	3	5
	%	66.7	0.0	33.3	75.0	0.0	25.0	11.1	33.3	55.6
Herbi-										
cides	No.	1	0	2	4	0	4	5	0	4
	%	33.0	0.0	66.7	50.0	0.0	50.0	55.6	0.0	44.4
Pesti-										
cides	No.	1	0	2	4	0	4	3	1	5
	%	33.3	0.0	66.7	50.0	0.0	50.0	33.3	11.3	55.6
Tractors	No.	1	0	2	0	1	7	0	0	9
	%	33.3	0.0	66.7	0.0	12.5	87.5	0.0	0.0	100
Sowing	No.	1	1	1	3	2	3	4	1	4
machine	%	33.3	33.3	33.3	37.5	25.0	37.5	44.4	11.1	44.4
Sprayer	No.	0	0	3	5	1	2	0	0	9
	%	0.0	0.0	100	62.5	12.5	25.0	0.0	0.0	100.0
Transport	No.	1	0	2	1	1	6	0	0	9
	%	33.3	0.0	66.7	12.5	12.5	75.0	0.0	0.0	100
Total	No.	9	2	13	24	9	31	13	7	52
	%	37.5	8.3	54.2	37.5	14.1	48.4	18.1	9.7	72.2

Che: Cheap, Med.: Medium, Exp: Expensive

Table 7.33: The distribution of farmers by their perception of the price of wheat

	View of the price	Group	Zone1 + Zone2		Zone1		Zone2	
			No.	%	No.	%	No.	%
Did not	Low	(AAA)	5	31	4	44	1	14
sell	Fair	(BBB)	11	69	5	56	6	86
Sell	Low	(CCC)	27	61	19	61	8	62
	Fair	(DDD)	17	39	12	39	5	38

Table 7.34: The distribution of HIGH, MEDIUM and LOW adopters by their perception of the price of wheat

	View of the price	Zone1 (40)						Zone2 (20)					
		H (7)		M (23)		L (10)		H (3)		M (8)		L (9)	
		No.	%	No.	%	No	%	No.	%	No.	%	No	%
Did not sell	L1	1	100	0	0	3	60	0	0	1	50	0	0
	F1	0	0	3	100	2	40	0	0	1	50	5	100
Sell	L2	2	33	14	70	3	60	2	67	4	67	2	50
	F2	4	67	6	30	2	40	1	33	2	33	2	50

L1: Low (AAA), F1: Fair (BBB), L2: Low (CCC), F2: Fair (DDD).

Table 7.35: The ANOVA test shows the level of difference among farmers who perceive the price of wheat as low to those who perceive it as fair in relation to Adoption Behaviour Scores

View of the price		Zone1				Zone2			
		No.	Mean	VR	F(P)	No.	Mean	VR	F(P)
Did not sell	L	4	19.3	2.281	NS	1	17	1.347	NS
	F	16	20.2			6	13.2		
Sell	L	2	30.1			8	21.4		
	F	11	35.3			5	24.6		

L1: Low (AAA), F1: Fair (BBB), L2: Low (CCC), F2: Fair (DDD).

Table 7.36: The relation of the Institutional and Economic factors with the Adoption Behaviour Scores of farmers

Factor	Zone1		Zone2	
	r	p	r	p
Soil type	0.1186	NS	-0.1512	NS
Farm type	0.1753	NS	0.3259	NS
Machinery and equipment	0.6053	< 0.001	0.5664	0.01
Livestock	-0.0221	NS	-0.097	NS
Farm road conditions	0.4497	< 0.01	0.2192	NS
General perception of the accessibility of innovation	0.3666	< 0.05	0.0831	NS
General perception of the cost of innovations	0.7444	< 0.01	0.4830	< 0.05
Access to market	0.1094	NS	0.0169	NS
Perception of access to Extension	0.3455	< 0.05	0.4433	0.05
Perception of the price of wheat	0.2217	NS	-0.1253	NS
Wheat as a cash crop	0.3662	< 0.05	0.4236	NS
Credit and own cash money	0.6259	< 0.001	0.5070	< 0.05

Table 7.37: Summary of the characteristics of the HIGH, and LOW adopters in relation to Personal and Socio Economic, and the Economic and Institutional variables.

HIGH adopters	LOW adopters
Zone1	
Have fragmented farms	Have consolidated farms
Have large family	Have small family
Live in extended family	Live in nuclear family
Literate	Illiterate
Have educated family	Have family which is not educated
Have well equipped farms	Have farms which are not well equipped
Have good road conditions	Have poor road conditions
Perceive the accessibility of innovations as easy	Perceive the accessibility of innovations as difficult
Own cash is available	Lack of own cash
Wheat is a cash crop for them	Wheat is more of a subsistence crop
Perceive the accessibility of Extension as easy	Perceive the accessibility of Extension as difficult
See that innovations are cheap	See innovation as very costly
Zone2	
Third of them have farm size above 50 hectare	None has farm size above 50 hectare
Large family is more dominant	Average and small family are more dominant
Third have their own farm equipment and machinery	None have equipment and machinery
Own cash is available	Lack of own cash
Many see that innovations are cheap	Most see innovations as expensive

CHAPTER 8

The Syrian Farmers Studied:-Communicational Factors

8.1 Introduction

The knowledge of innovations is very important before making the decision to adopt. The more farmers have knowledge about an innovation the more likely for them to innovate. This could mainly be related to the reduction of the risk associated with the innovation.

The effect of both direct and indirect communication on the adoption behaviour of farmers is discussed in more detail in this chapter. The direct communication is face to face communication, i.e. the communicator and the receiver of the message meet each other such as the visit by extension workers to farmers. The indirect communication involves a communicator who does not personally meet the receiver of the message, i.e. the message of the communicator is received through other media such as radio. The quantity of information, total channels which have been utilized by farmers, and the quality of information, type of channels which have been utilized by farmers were both expected to influence the adoption of the related farm innovations.

The overall objective of this research is to study conditions under which farmers live, interact and adopt innovations in order to improve their adoption behaviour. It is thus felt that to achieve a better understanding of adoption behaviour of farmers, the background information about the Extension Organisation is needed. Therefore, this chapter, will give more detailed analysis of extension and its role as an explanatory factor for the adoption behaviour of farmers.

8.2 Sources of information which have been utilized

Farmers were asked to report the sources which were used by them in order to get information about farm innovations or new practices. Also, they were asked to state the main source which they relied on.

8.2.1 Total number of sources which have been utilized

Six different sources of information about agricultural innovations were reported by farmers. These were; "neighbour", "extension", "mass media", "cooperative", "previous generation" and "others" such as trader, training course or study tour.

The result shows that over half of the farmers, 53.4%, have utilized three to four sources of information, 23.4% utilized five to six sources and 23.4% have utilized one to two sources, Table 8.1.

In Zone1 85.6% of the HIGH adopter farmers have utilized five to six sources of information compared to 21.7% and 0% of the MEDIUM and LOW adopters respectively. None of the HIGH adopters were found to be utilizing only one or two sources of information while 26% of the MEDIUM adopters and 40% of the LOW adopters did so. In Zone2, 33.3% of the HIGH adopters have utilized five to six sources of information compared to 12.5% and 11.1% for the MEDIUM and LOW adopters respectively. None of the HIGH adopters were found to be utilizing only one or two sources compared to 25% and 22% of the MEDIUM and LOW adopters respectively, Table.8.2.

In both zones, a positive relation was found between the total number of sources of information which have been used by farmers and their Adoption Behaviour Scores, r=0.6878 and r=0.4020 for Zone1 and Zone2 respectively. This relation was found to be significant at $p<0.01$ in Zone1 while this relation in Zone2 was not significant. This would emphasise the role of several sources or information channels in influencing the adoption behaviour of farmers, particularly, in Zone1, Table 8.62.

8.2.2 Main source of information

As has been mentioned above, six different sources for obtaining agricultural information were reported by farmers. Only five out of the six were mentioned by farmers as a main sources for them. These were; "neighbour",

Table 8.1: The distribution of farmers by the total number of sources of information which have been utilized by them

Source	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
One	6.7	7.5	5.0
Two	16.7	17.5	15.0
Three	31.7	27.5	40.0
Four	21.7	20.0	25.0
Five	6.7	7.5	5.0
Six	16.7	20.0	10.0

Table 8.2: The distribution of HIGH, MEDIUM and LOW adopters according to the total number of sources of information which been have utilized by them

Source	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
One	0.0	8.7	10.0	0.0	0.0	11.1
Two	0.0	17.4	30.0	0.0	25.0	11.1
Three	0.0	30.4	40.0	0.0	25.0	66.7
Four	14.3	21.7	20.0	66.7	37.5	0.0
Five	14.3	8.7	0.0	33.3	0.0	0.0
Six	71.4	13.0	0.0	0.0	12.5	11.1

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

"extension", "mass media", "cooperative" and "previous generation". The last source which was "others" was considered as a minor source for information by all farmers. The percentage of farmers who reported "neighbour" as the main source for them in order to get new information about farming was found to be 41.7% followed by "previous generation", 25%, "extension", 20%, "cooperative", 6.7%, and "mass media", 6.7%, Table 8.3.

In Zone1, the most popular main sources for new agricultural information among the HIGH adopter farmers were found to be "extension", 42.9%, and "neighbour", 42.9%, while "neighbour" alone was the most popular for the MEDIUM and LOW adopters, (39.1% and 50% respectively). In Zone2, the most popular source amongst the HIGH and MEDIUM adopters was found to be "extension", (66.7% and 50% respectively), while the most popular source among the LOW adopters was found to be "neighbour", 66.7%, Table 8.4.

In order to see the differences among the farmers' main sources of information, in relation to their adoption of innovations, the Analysis of Variance (ANOVA) was applied.

In both zones, the Analysis of Variance (ANOVA) test showed significant differences at $p=0.001$ and $p<0.001$ for Zone1 and Zone2 respectively among the five main sources for new agricultural information in relation to the Adoption Behaviour Scores of farmers. Extension and mass media in both zones showed the highest means of Adoption Behaviour Scores among the other sources of information, Table 8.5.

In Zone1, the Least Significant Differences (LSD) test showed no significant differences between farmers who utilized "mass media" and "extension", "mass media" and "cooperative", or "cooperative" and "extension". There were significant differences between "mass media" on the one side and both of "neighbour" and "previous generation" on the other side. Similarly, there were significant differences between "extension" and both of "neighbour" and "previous generation". In Zone2, The LSD test showed significant differences between farmers who utilized "extension" on the one side and those who utilized "neighbour" and "previous generation" on the other side. Examination of table 8.5 would confirm the importance of "mass me-

Table 8.3: The distribution of farmers by the main source for new information about farming

Main source	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Neighbour	41.7	42.5	40.0
Extension	20.0	15.0	30.0
Mass media	6.7	7.5	5.0
Cooperative	6.7	5.0	10.0
Previous generation	25.0	30.0	15.0

Table 8.4: The distribution of HIGH, MEDIUM and LOW adopters according to the main source for getting information about farming

Main source	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Neighbour	42.9	39.1	50.0	0.0	25.0	66.7
Extension	42.9	13.0	0.0	66.7	50.0	0.0
Mass media	14.3	8.7	0.0	33.3	0.0	0.0
Cooperative	0.0	8.7	0.0	0.0	12.5	11.1
Previous generation	0.0	30.4	50.0	0.0	12.5	22.2

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

dia" and "extension", as effective contacting channels. This would suggest importance of direct and indirect communication by the extension service as an important channel for agricultural information.

8.3 Agricultural Extension

8.3.1 Introduction

Most of the farmers, 93%, were found to be "aware of the existence"[1] of the agricultural extension organisation in the country, while only 7% had never heard of it. Also, over half of the farmers, 55%, were found to know exactly the purpose behind establishing this organisation in the country, i.e they were "aware", 25% knew to "some extent" and 20%, (including farmers who were not aware of the existence of Extension), could not say even one word about it, i.e. they were "not aware". The majority of farmers, 83%, had not got an Extension worker in their home village.

8.3.2 Face to face communication

This direct information includes the mutual exchange visits between farmers and Extension workers, an Extension plot on the farm, visiting and attending the cooperative meeting, and other activities such as involvement in study tours, field days and training courses.

8.3.2.1 Extension worker

1. Farmer visits to extension worker

   The majority of farmers, 70%, had never visited an Extension worker at his office, 6.7% visited him "rarely", 10% visited him "sometimes" and 13.3% visited "regularly", Table 8.6.

   In Zone1, only 14.3% of the HIGH adopters had not contacted the Extension workers at their offices at all compared to 82.6% and 90% of the MEDIUM and LOW adopters respectively. In Zone2, 33.3% of the HIGH adopters did not contact the Extension workers at their offices

[1] Awareness of the existence of the source of information, (knowledge about innovations), by farmers does not mean that farmers know what the source is for. Farmers in this study are counted as "aware" of the source if they know that the source is for them to obtain knowledge about innovations. For example, farmers who heard of the source but did not know what the source is for were counted as "not aware"of the source or channel.

Table 8.5: The ANOVA test shows the level of differences among the five main sources for agricultural information in relation to the Adoption Behaviour Scores of farmers

Groups	Zone1				Zone2			
	No.	Mean	VR	F(PR)	No.	Mean	VR	F(PR)
Neighbour	17	27.9	5.772	0.001	8	12.9	10.077	<0.001
Extension	6	45.2			6	27.0		
Mass media	3	43.3			1	46.0		
Cooperative	2	28.5			2	17.0		
Previous generation	12	20.1			3	15.0		

No.: Number of farmers, Mean: Mean Adoption Behaviour Scores for each group, VR: F ratio, F(PR): Level of significancy.

Table 8.6: The distribution of farmers by their visit to Extension offices

Farmer visits to Extension	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Did not visit	70.0	72.5	65.0
Visited rarely	6.7	2.5	15.0
Visited sometimes	10.0	12.5	5.0
Visited regularly	13.3	12.5	15.0

compared to 50% and 88.9% of the MEDIUM and LOW adopters respectively, Table 8.7.

In both zones, a positive relation was found between the contact with Extension, farmers making the contact, and the Adoption Behaviour Scores of farmers, r=0.5318 and r=0.4218 for Zone1 and Zone2 respectively. The level of association in Zone1 reached the level of significancy at $p<0.01$ while the association in Zone2 was not significant. This would suggest the importance of this factor on the adoption behaviour of farmers in Zone1.

2. Extension worker paying visits to farmer

Most of the farmers, 81.7%, had not been visited at all by an Extension worker, 8.3% had been visited "rarely", and 8.3% been visited "sometimes" and only 1.7% had been visited "regularly", Table 8.8.

In Zone1, the majority of the HIGH adopters, 71.5%, have been visited by Extension workers compared to 8.7% and 0% of the MEDIUM and LOW adopters respectively. In Zone2, 33.3% of the HIGH adopters had been visited by the Extension worker compared to 37.5% and 0% of the MEDIUM and LOW adopters respectively, Table 8.9.

In both zones, a positive association was found between the contact of Extension worker with farmers and the Adoption Behaviour Scores of farmers, r=0.5032 and r=0.2982 for Zone1 and Zone2 respectively. In Zone1 the level of association was significant at $p<0.01$ while this association was not significant, in Zone2. This again would suggest the importance of Extension contact with farmers in the adoption of innovations and improved practices, see Table 8.62.

3. The perception of Extension workers by farmers

"I see the Extension worker like a soldier.....I disappear , and hide myself from him when he comes to visit our village". "Extension workers dictate to us the agricultural plan without the consideration of our situation and our problems". "Extension worker is good in counting the cattle and taking the serial numbers of machinery, but not any thing else". "Extension workers are working against us but

Table 8.7: The distribution of HIGH, MEDIUM and LOW adopters according to their visit to Extension offices

Farmer visits to Extension	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Did not visit	14.3	82.6	90.0	33.3	50.0	88.9
Visited rarely	14.3	0.0	0.0	33.3	12.5	11.1
Visited sometimes	28.6	8.7	10.0	0	12.5	0.0
Visited Regularly	42.9	8.7	0.0	33.3	25.0	0.0

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

Table 8.8: The distribution of farmers according to Extension workers contact with them

Ext. worker visits to farmers	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Did not visit	81.7	82.5	80.0
Visited rarely	8.3	7.5	10.0
Visited sometimes	8.3	10.0	5.0
Visited regularly	1.7	0.0	5.0

not with us". "We went to see Extension worker at his office several time asking for help but there was no response at all, just as if we were talking to a deaf person". "It is very easy to contact Extension workers but they have nothing to give us". "Extension workers care about their salary but they do not care about us getting developed". "I feel like a stranger when I go to Extension worker office.....most of the time when I went there I could not find them". "Extension workers needs formal invitations in order to come and see us". "Unfortunately, we have been neglected by the Extension". These are what some farmers said about Extension workers and the Extension Organisation.

But other farmers convey the contrary story, they said: " Without Extension workers efforts we could not use or adopt herbicides or pesticides and other innovations.

The majority of farmers, 66.7%, did not receive directly any new information from Extension workers simply because they had never been in contact with them, Table 8.10.

Only 5% of the farmers who contacted, or, had been contacted by extension workers reported that the contact with Extension workers did not help their decision in order to adopt innovations at all. While half of them reported that they have benefited to some extent from this contact and 45% reported that they have benefited greatly, i.e. "the contact with extension workers helped them very much to make their decision to adopt innovations", Table 8.11.

When farmers who did not visit the Extension workers or have never been visited by them were asked the following question: "If the Extension worker did not visit you, then why did not you visit him?" Most of the farmers said: "God helps Extension worker, he has nothing to give us, we know farming better than him".

When the whole sample of farmers were asked about their advice to make the "Extension" work well and be more effective in order to speed up the adoption of innovations by them, they said: " An Extension worker has to be with us, but not against us". "Extension worker has

Table 8.9: The distribution of HIGH, MEDIUM and LOW adopters according to the Extension workers contact with them

Ext. worker visits to farmers	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Did not visit	28.6	91.3	100.0	66.7	62.5	100.0
Visited rarely	42.9	0.0	0.0	33.3	12.5	0.0
Visited Sometimes	28.6	8.7	0.0	0.0	12.5	0.0
Visited Regularly	0.0	0.0	0.0	0.0	12.5	0.0

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

Table 8.10: The distribution of farmers by the level of benefits that they received from Extension workers in order to help them in making their decision to adopt innovations

Level of benefits	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
A	66.7	67.5	65.0
B	1.7	0.0	5.0
C	16.7	15.0	20.0
D	15.0	17.5	10.0

A: Did not get any because no contact., B: Did not get any although they made contact., C: Helped to some extent., D: Helped a lot.

to wear 'jeans' and leave his tie and table and demonstrate to us his package". "Extension worker has to give us only the new information about his package". "If Extension worker advises us to follow some new things then the required material has to be available". "Extension worker has to study our situation first before doing any thing". "We do not need anything from Extension workers, we just want him to leave us alone". "We do not believe in Extension work". Of course some farmers gave no comments, see Table 8.12.

4. Conclusion

It can be concluded from the above explanation that: Firstly, a relation between adoption and contact with Extension workers existed. Secondly, few farmers have benefited from the Extension workers because they did not make contact, or, the Extension workers did not contact them. Thirdly, most of farmers who did not make contact did not believe that current Extension workers can do anything for them. Fourthly, the credibility of the Extension workers among farmers, especially those who were never in contact with them, was very low because they were involved in doing some jobs which farmers felt did not relate to Extension work at all. This has led farmers to see Extension worker like a policeman or tax collector. This would suggest that the task of the future work of "Extension" would not be an easy one. A lot of effort, first of all, should be directed towards restoring the credibility and the prestige of "Extension" workers among farmers. This might be assisted by applying and utilizing the findings of this research thesis and other research, second improving the mobility and transport resources of the Extension worker.

8.3.2.2 The village cooperative

1. Farmers visits to the cooperative

Over half of the farmers, 53.3%, did not visit the village cooperatives simply because they were not members or were not involved in their administrative activities, more than a quarter of the farmers, 28%, visited their cooperatives "regularly", 10% visited them "sometimes"

Table 8.11: The distribution of farmers (only those who have contact with Extension) by the level of benefits that they received from Extension agent in order to help them in making their decision to adopt

Level of benefits	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
B	5	0	14
C	50	46	57
D	45	54	29

B: Did not get any although they made contact., C: Helped to some extent., D: Helped a lot.

Table 8.12: The distribution of farmers by their advice statement to Extension worker

Advice	Zone1 + Zone2 (60)		Zone1 (40)		Zone2 (20)	
	Mentioned %	Not %	Mentioned %	Not %	Mentioned %	Not %
1."Be with us"	47.0	53.0	42.5	57.5	55.0	45.0
2."Wear jeans and demonstrate to us"	45.0	55.0	42.5	57.5	50.0	50.0
3."Give us new information only"	12.0	88.0	12.5	87.5	10.0	90.0
4."Recommendation has to be available"	7.0	93.0	10.0	90.0	0.0	100.0
5."Study our situation"	3.0	97.0	0.0	100.0	10.0	90.0
6."To leave us alone"	7.0	93.0	10.0	90.0	0.0	100.0
7."Not believe in Extension work"	5.0	95.0	5.0	95.0	5.0	95.0
8.No comment	18.0	82.0	17.5	82.5	20.0	80.0

and 8.3% visited them "rarely", Table 8.13.

The majority of farmers, 59%, who were not members of the cooperative were found to know that the cooperatives were established to provide farmers with inputs as well as new information. All farmers who were members were aware of the full role of the cooperatives. This brings the total percentage of farmers who were aware of the full role of the cooperative to 78%.

In Zone1, only 14.2% of the HIGH adopter farmers were found as not visiting the cooperative at all, (because they were not involved in their activities), compared to 56.5% and 60% of the MEDIUM and LOW adopters respectively. In Zone2, 66.7% of the HIGH adopters, 66.7% of the LOW adopters and half of the MEDIUM adopters did not visit the cooperative because they were not involved in their activities or were not members, Table 8.14.

In both zones, a positive association was found between contacting the cooperative by farmers and their Adoption Behaviour Scores, r=0.4542 and r=0.1553 for Zone1 and Zone2 respectively. The degree of association was found to be significant at $P<0.01$ in Zone1 but the association in Zone2 was not significant.

2. Farmers attending the cooperative meeting

A quarter of farmers who were members of the village cooperatives were found to be "never involved" in their meetings, 6.7% were involved "rarely", another 6.7% involved "sometimes" and 61.7% were involved "regularly", Table 8.15.

In Zone1, none of the HIGH adopters who were members of the cooperative were found not to be attending the cooperative meetings compared to 20% and 50% of the MEDIUM and LOW adopters respectively. In Zone2, also, none of the HIGH adopters did not attend the cooperative meetings compared to 50% and 33% of the MEDIUM and LOW adopters respectively, Table 8.16.

In both zones, a positive association was found between farmers' involvement in the cooperative meeting and their Adoption Behaviour

Table 8.13: The distribution of farmers by their visits to the village cooperative

Farmer visits to cooperative	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Did not go	53.3	50.0	60.0
Rarely	8.3	7.5	10.0
Sometimes	10.0	12.5	5.0
Always	28.3	30.0	25.0

Table 8.14: The distribution of HIGH, MEDIUM and LOW adopters according to their visits to the cooperative

Farmer visits to cooperative	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Did not go	14.3	56.5	60.0	66.7	50.0	66.7
Rarely	0.0	4.4	20.0	0.0	0.0	22.2
Sometimes	0.0	17.4	10.0	33.3	0.0	0.0
Always	85.7	21.7	10.0	0.0	50.0	11.1

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

Table 8.15: The distribution of farmers by their attendance at the cooperative meeting

Attendance	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Did not go	25.0	20.0	35.0
Rarely	6.7	10.0	0.0
Sometimes	6.7	10.0	0.0
Always	61.7	60.0	65.0

Table 8.16: The distribution of HIGH, MEDIUM and LOW adopters according to their attendance at the cooperative meetings

Attendance	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (6)	M (10)	L (4)	H (1)	M (4)	L (3)
Did not go	14	20	50	0	50	33
Rarely	0	10	25	0	0	0
Sometimes	0	20	0	0	0	0
Always	86	50	25	100	50	67

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

Scores, r=0.4875 and r=0.0979 for Zone1 and Zone2 respectively. This association in Zone1 was significant at $p<0.01$ but in Zone2 a very weak relation was found.

3. The perception of the village cooperative by farmers

Some farmers considered the cooperative as helpful for them and some have complained about them. Here are some of their statements. "Without the intervention of the cooperative, I would have never adopted chemical fertilizers". "We are very happy with the cooperative services because it is very easy for us to obtain the inputs and new information as well as to the help in marketing of our output". "I do not believe in the cooperative work, it is not successful at all". "Our cooperative has two tractors but because of its bad management, these two tractors were never used for helping the cooperative members".

Over half of the farmers, 53%, have not been helped by the cooperative in making their decisions in order to adopt innovations, simply because they never been involved in their activities. About half of the farmers, 46%, who were involved in the cooperative activities have reported that they have not been helped by the cooperative in making decisions to adopt innovations, 36% reported that they have been helped to "some extent" and 18% were "helped a lot", Tables 8.17 and 8.18.

4. Conclusion

In Zone1, it was shown that there was a significant relationship between the Adoption Behaviour Scores of farmers and their involvement in the cooperative activities. Therefore, farmers should be advised to join the cooperative services since this joint action might lead to an improvement in the adoption behaviour of farmers.

In fact, as has been seen, more than half of the farmers, 53%, were found out of the cooperative influence. The reasons which were reported for this were different from one group of farmers to another. Over one third of the farmers, 34%, who were out of the cooperative's influence reported that they "did not believe in the cooperative", 38% reported that "the cooperatives were not available in their villages",

Table 8.17: The distribution of farmers by the level of benefits that they received from cooperative service in order make decisions to adopt

Farmer visits to cooperative	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
A	53.3	50.0	60.0
B	21.7	17.5	30.0
C	16.7	20.0	10.0
D	8.3	12.5	0.0

A: Did not get any because no involvement., B: Did not get any although they have been involved., C: Helped to some extent., D: Helped a lot.,

Table 8.18: The distribution of farmers (only those who are involved in cooperative activities) by the level of benefits that they received as a consequences of their involvement in cooperative service in order to make decision to adopt

Farmer visits to cooperative	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
B	46	35	75
C	36	40	25
D	18	25	0

B: Did not get any although they have been involved., C: Helped to some extent., D: Helped a lot.,

19% said that they "were prevented from joining the cooperative because of some regulations, such as their land property was not registered in their name or their name was not registered", 6% were "afraid of being tied to debt", and only 3% reported that they "did not need the cooperative services".

Again, a lot of work is needed in order to facilitate farmers joining the cooperative activities. Some action is related to farmers themselves and some is related to the possibility of establishing more new cooperatives and more importantly abolishing and modifying the cooperative legislation in order to give an opportunity for every farmer to join their activities.

However, if efforts are made to bring farmers together to join the cooperative then any collective arrangement to bring them together in a small group would be of great importance. For example, group discussion, the Extension service contacting groups, and a forum or any type of informal groups. The ultimate objective of these groups at the beginning is to initiate dialogue among farmers in order to benefit from each other. Secondly, this type of gathering and cooperation might lead farmers to think again about the cooperative work and as a consequence these groups themselves might be turned into cooperatives or something similar where farmers can get information and financial support.

The improvement of the effectiveness of the existing cooperatives should not be forgotten because 46% of their members complained about the services in their own cooperatives.

8.3.2.3 Agricultural Extension plot

1. Involvement

Extension plots or field demonstrations are organised by the Ministry of Agriculture through the Directorate of Extension, Unit of Experimental Plots. It is a part of the Extension worker's duties to share in organising this kind of activity. The prime objective of the plot is to stress new techniques and innovations such as insecticides, herbicides

or fertilizers usage. The package of the plot contains instructions for the Extension worker to work with. Farmers who participate in this activity provide land and labour and the government supplies him with all other inputs in a form of a package, this contains materials and instructions. However, there is no compensation for farmers if the plot fails.

Only 15% of the farmers were found to be not "aware of the existence of the Extension plot", 50% have "heard of it without knowing what it looks like", 25% have "just seen some stages, and some of the results, of a plot", 10% "had a plot on their land", i.e. they were involved from the first stage until the last stage of accomplishing the plot, Table 8.19.

The majority of farmers, 73%, who have "merely heard of the Extension Plot" did not know the purpose of the plot, i.e. they were not fully aware of the potential of the plot. This would bring the total percentage of farmers who were not really aware of the plot to 52%.

In Zone1, none of the HIGH adopter farmers were found to be unaware of the existence of the Extension plot compared to 21.7% of the MEDIUM adopters and 30% of the LOW adopters. The percentage of HIGH adopters who have had an Extension plot on their land was found to be 43.3% compared to 8.7% and 0% of the MEDIUM and LOW adopters respectively. In Zone2, none of the HIGH adopters or LOW adopters had a plot on their land compared to 12.5% of the MEDIUM adopters, Table 8.20.

In both zones, a positive association was found between the level of involvement in Extension plots and the Adoption Behaviour Scores of farmers, r=0.6390 and r=0.1529 for Zone1 and Zone2 respectively. This association in Zone1 was found to be significant at $p<0.01$ while this association in Zone2 was weak. The weak association in Zone2 might be attributed to the very low level of involvement of farmers in Extension plot activities. This low involvement for farmers is expected because of the delay in paying attention to this zone. Therefore, it

Table 8.19: The distribution of farmers by the level of their involvement in the Extension plot

Level of involvement	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Not heard	15.0	20.0	5.0
Merely heard	50.0	50.0	50.0
Seen some stages	25.0	17.5	40.0
Achieved one or more on their farm	10.0	12.5	5.0

Table 8.20: The distribution of HIGH, MEDIUM and LOW adopters according to their involvement in the Extension plot

Level of	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
involvement	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Not heard	0.0	21.7	30.0	0.0	12.5	0.0
Merely heard	14.3	52.2	70.0	33.3	50.0	55.6
Seen some stages	43.3	17.4	0.0	66.7	25.0	44.4
Achieved one or more on their farm	43.3	8.7	0.0	0.0	12.5	0.0

might be not possible at this stage to see the effect of Extension plot on farmers' adoption behaviour in Zone2, Table 8.62.

In Zone1 only, the ANOVA test showed significant differences at p<-0.01 among the four different groups, ("not heard", "merely heard", "just visited or seen some stages", "achieved on own land"), in relation to the Adoption Behaviour Scores of farmers. The highest mean of Adoption Behaviour Score, which was 46.6, was found with a group of farmers who had a plot on their land , followed by 41.1, 24.5 and 20.4 for the group of the farmers who have "seen some stages of the plot", who "merely heard" and who "not heard it" respectively.

Also, in Zone1, the LSD test showed significant differences at p<0.01 between farmers who had an Extension plot on their land on the one side and those who "merely heard" of it and who "not heard" of it on the other side in relation to the Adoption Behaviour Scores. Also, LSD test showed significant differences at p<0.01 between farmers who have "seen some stages of the plot" on the one side and all of those who "merely heard of the plot" and who "had not heard of it". There was no significant difference between farmers who "had the plot on their land" and those who "have seen some stages of it" or between farmers who "merely heard" or who "not heard of it". This would suggest that farmers who had seen some stages of the plot or who had become interested in the plot by asking their neighbours, Extension workers, or other sources of information about the plot became able to understand information which was conveyed by the plots.

2. The perception of the Extension plot by farmers

Some farmers seem to be happy with the Extension plot and some were not. Here are some of their comments about plots. "It is absolutely rubbish". "It is the best medium I ever have seen". "I wonder why is it called Extension plot since farmers do it themselves with no assistance from extension worker except a little oral advice". "Last year my neighbour had a plot in his field but I did not know of it until the next following year". "I liked the plot very much despite the fact I did

not do it on my land". "I have seen some stages of several plots but I wonder when I am going to see the results of them". "I asked several times about the result of these plots, the people who were responsible for them never gave an answer to my question".

The majority of farmers, 65%, have not been helped directly by the Extension plot in making their decision to adopt innovations simply because they were not involved in the plot, i.e. they have not visited or had a plot on their land, Table 8.21.

Over half of the farmers, 52%, who were involved in the plot reported that "they have not been helped by the Extension plot for making their decision to adopt innovations", 5% have reported that "they have been helped to some extent" and 43% reported that "they have been greatly helped by the Extension plot in making their decision to adopt", Table 8.22.

3. Conclusion

It can be concluded from the statistical analysis and farmers comments about the Extension plot that few farmers have benefited from them, even those farmers who to some extent were involved. This was due to several reasons. First of all, Extension workers were very little involved. Second, the only farmers who have been well informed about the plot were the ones who had the plot on their land and the rest of farmers knew little about the plot. Thirdly, because there were no local adaptation of the package provided for the plot. Fourthly, the Extension organisation recommends its Extension workers to publicise only the successful results of the plots, but it seems that neither successful nor failure results have been shown to farmers.

The low level of involvement in the plot by the Extension worker might lead to a reduction in his credibility if the package of the plot was misunderstood by farmers and was applied in an incorrect way. Therefore, Extension workers should be involved directly especially in the complicated package, and work with farmers and not leave them to do it by themselves without showing them how to do it. If this is not

Table 8.21: The distribution of farmers by the level of benefit that they received from Extension plots in order to help them in their decision making

Level of benefit	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
A	65.0	72.5	50.0
B	18.3	10.0	35.0
C	1.7	2.5	0.0
D	15.0	15.0	15.0

A: Did not get any because no involvement., B: Did not get any although they were involved., C: Helped to some extent., D: Helped a lot.

Table 8.22: The distribution of farmers (only those who were involved in Extension plots) by the level of benefits that they received as a consequence of their involvement in the plot

Level of benefit	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
B	52	36	70
C	5	9	0
D	43	55	30

B: Did not get any although they were involved., C: Helped to some extent., D: Helped a lot.

done, innovations would not be adopted and there would be a further decrease in the level of Extension workers' credibility.

The publicity of Extension plots and farmers' involvement in them were found to be very low, this is because of the fear of failure of the plot. However, if the Extension worker works together with farmers in running the plot from the first stage until the results then there is no problem if the plot fails because both Extension worker and farmers were all involved. This would reduce the harm to the Extension worker's credibility, instead it would harm the original sources of innovations. If the Extension service considers demonstration or plot as adaptive research for verifying the suitability of the research findings one must ask why there was little evidence of publicizing the successful results.

8.3.2.4 Others sources

These include study tours, field days and farmers' training.

1. Involvement

   In general terms, the awareness of the farmers of the existence of the three mentioned sources for agricultural information, (study tours, field days and training course), were found to be very low. The involvement of farmers in them was found to be much worse and almost none. For example, 78% of the farmers "did not hear of the study tour", 67% "did not hear of the field day" and 52% "did not hear of the existence of farmers' training course". Concerning the farmers involvement in these three activities, only two percent of the farmers have been involved in a study tour, also 2% were found to be involved in a field day and 7% were found to be involved in a farmers' training course. All these farmers were found to be "rarely" involved in the three mentioned activities, Tables 8.23 and 8.24.

   Only farmers who were involved in the three mentioned activities were found to know the purpose of these activities. This means that only 2% were aware of the role of the study tour , 2% were aware of field days and 7% were aware of the role of the training courses.

Table 8.23: The distribution of farmers by their awareness of study tours, field days and training courses

Activity	% of farmers in both zones (60)		% of farmers in Zone1 (40)		% of farmers in Zone2 (20)	
	Did not	Heard	Did not	Heard	Did not	Heard
Study tour	78.0	22.0	75.0	25.0	85.0	15.0
Field day	67.0	33.0	67.5	32.5	65.0	35.0
Training courses	52.0	48.0	62.5	37.5	30.0	70.0

Table 8.24: The distribution of farmers by their involvement in study tours, field days and training courses

Activity	% of farmers in both zones (60)				% of farmers in Zone1 (40)				% of farmers in Zone2 (20)			
	N	R	S	A	N	R	S	A	N	R	S	A
Study tour	98	2	0	0	98	3	0	0	100	0	0.0	0.0
Field day	98	2	0	0	98	3	0	0	100	0	0.0	0.0
Training courses	93	7	0	0	93	8	0	0	95	5	0.0	0.0

N: Not involved at all., R:Rarely involved., S:Sometimes involved., A:Always involved.

However, since most of farmers were found to be not involved in the mentioned activities, it was not possible to draw a conclusion upon these activities except the potential of increasing farmer involvement in these activities.

8.3.3 Mass media

This involves the indirect communication with farmers. It includes television, radio, publications and agricultural extension film shows.

8.3.3.1 Television

1. General

   The majority of farmers, 73.3%, have got television sets at home, Table 8.25.

   The limitation to possessing television sets is a lack of electricity. In Zone1, none of the HIGH adopters were found not to have a television set compared to 13% and 40% of the MEDIUM and LOW adopters respectively. In Zone2, 66.7% of the HIGH adopters did not have a television set at home compared to 25% and 55.6% of the MEDIUM and LOW adopters respectively, Table 8.26.

   The percentage of farmers who did not watch television at all was found to be 22% while 33% watched it "rarely", 20% watched it "sometimes" and 25% watched it "regularly", Table 8.27.

   In Zone1, none of the HIGH adopter farmers were found not to watch television compared to 13% and 20% of the MEDIUM and LOW adopters respectively. In Zone2, 66.7% of the HIGH adopters could not watch television because there was no electricity compared to 25% and 44.4% of the MEDIUM and LOW adopters respectively, Table 8.28.

2. "Our Green Land"

   Over a quarter of farmers, 28.3%, were found to be not aware of the existence of "Our Green Land", (see Chapter 4). Only 5% of the farmers who were found to be aware of the existence of the programme did not watch it. However, the total percentage of farmers who did

Table 8.25: The distribution of farmers by their possession of a television set

Possessing television	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Has not	26.7	17.5	45.0
Has	73.3	82.5	55.0

Table 8.26: The distribution of HIGH, MEDIUM and LOW adopters according to their possessing of a television set

Possessing	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
television	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Has not	0	13	40	66.7	25	55.6
Has	100	87	60	33.3	75	44.4

Table 8.27: The distribution of farmers by their habit of watching television

Watching television	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Did not	22.0	12.5	40.0
Rarely	33.0	42.5	15.0
Sometimes	20.0	20.0	20.0
Always	25.0	25.0	25.0

not watch the programme was found to be 31.7%, compared to 33.3%, 15%, and 20% who watched it "rarely", "sometimes" or "regularly" respectively, Tables 8.29 and 8.30.

All farmers who were watching "Our Green Land" knew the purpose of it, i.e. they were aware of the role of it. While all farmers who were aware of the existence of the programme, but did not watch it, were unaware of its role. This would bring the total percentage of farmers who were not really aware of the role of "Our Green Land" to 33%.

In Zone1 none of the HIGH adopters were found to be unaware of the existence of "Our Green Land" compared to 26.1% and 30% of the MEDIUM and LOW adopters respectively. All the HIGH, MEDIUM and LOW adopters who were found to be aware of "Our Green Land" were found to be watching it. In Zone2, 66.7% of the HIGH adopters were found to be not aware of the existence of the programme because they have no television compared to 25% and 44.4% of the MEDIUM and LOW adopters respectively. This is because they have problem with electricity which is not the case for Zone1. All the HIGH and MEDIUM adopters who were aware of the programme were found to watch it compared to 60% of the LOW adopters, Table 8.31 and 8.32.

In both zones, a positive association was found between watching "Our Green Land" by farmers and their Adoption Behaviour Scores, r=0.4080 and r=0.3544 for Zone1 and Zone2 respectively. In Zone1, the association was significant at p=0.01 but in Zone2 this association was not significant even at P=0.05. The low level of association in Zone2 could be caused by the fact that the majority of the HIGH adopters did not have electricity at their village therefore they could not watch the programme. Based on that reason, it is not possible to assess the role of television programme on the adoption behaviour of farmers in Zone2, Table 8.62.

Concerning the perception of "Our Green Land" by farmers, they said: "We turn the television off when we see 'Our Green Land' on the screen". "The programme did not show agriculture". "The

Table 8.28: The distribution of HIGH, MEDIUM and LOW adopters according to their habits of watching television in general

Watching television	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Could not watch	0.0	13.0	20.0	67.0	25.0	44.4
Did not watch	0.0	0.0	0.0	0.0	0.0	0.0
Rarely	28.6	48.8	40.0	0.0	12.5	22.2
Sometimes	42.9	17.4	10.0	0.0	25.0	22.2
Always	28.6	21.7	30.0	33.0	37.5	11.1

Table 8.29: The distribution of farmers by their awareness of "Our Green Land"

Aware of "Our Green Land"	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Not aware	28.3	22.5	40.0
Aware	71.7	77.5	60.0

Table 8.30: The distribution of farmers by their habit of watching "Our Green Land"

Watching "Our Green Land"	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Could not watch	26.7	17.5	45.0
Did not watch	5.0	5.0	5.0
Rarely	33.3	42.5	15.0
Sometimes	15.0	12.5	20.0
Always	20.0	22.5	15.0

Table 8.31: The distribution of HIGH, MEDIUM and LOW adopters according to their awareness of "Our Green Land"

Aware of "Our	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
Green Land"	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Not aware	0.0	26.1	30.0	66.7	25.0	44.4
Aware	100.0	73.9	70.0	33.3	75.0	55.6

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

Table 8.32: The distribution of HIGH, MEDIUM and LOW adopters according to their habits of watching "Our Green Land"

Watching "Our	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
Green Land"	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Could not watch	0.0	13.0	30	66.7	25.0	55.6
Did not watch	0.0	13.0	0.0	0.0	0.0	11.1
Rarely	28.6	43.5	50.0	0.0	12.5	22.2
Sometimes	28.6	13.0	0.0	0.0	37.5	11.1
Always	42.9	17.4	20.0	33.3	25.0	0.0

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

programme shows nothing useful to us but its music and traditional songs". "We do not believe in this programme". "Every bit of information reported by this programme about wheat was very old". "The programme explains a lot about other crops but it shows nothing about wheat". "It gives false information about wheat"., "Its language is very difficult to understand because we are illiterate, and because we do not understand Arabic very well".

The programme is very general, i.e. it is not devoted to wheat only. There is no possibility for farmers to obtain details of wheat farming. The details of the programme are not given in advance, therefore, if they do not watch the programme regularly they miss the relevant activities.

About a third of the farmers, 32%, did not get any help from "Our Green Land" for making decisions to adopt innovations simply because they did not watch it. Also 68% of the farmers who watched the programme reported that they "did not get any benefit" for the programme for making their decision to adopt innovations, 20% have "benefited to some extent" and only 12% have "benefited a lot", Tables 8.33 and 8.34.

3. Conclusion

Very few farmers have got benefits from watching "Our Green Land". This was shown to mostly come from a lack of a television set, the lack of understanding of the programme and the old information which has been broadcast. Farmers, however, could justify their not watching to the programme by reporting many reasons such as "time of show", "burdensome", "too busy", "not interested in watching activities which do not relate to wheat" and so on. Therefore maximizing the benefit from the programme could mainly be achieved through the publicity and coordination between the mass media and Extension. For example, farmers should be informed about the subject of the next programme by television, radio, newspapers or even by Extension workers. This action has to be done some time before showing the pro-

Table 8.33: The distribution of farmers by level of benefits that they received from "Our Green Land"

Level of benefits	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
A	31.7	22.5	50.0
B	46.7	57.5	25.0
C	13.3	12.5	15.0
D	8.3	7.5	10.0

A: Did not get any because not watching., B: Did not get any help although they watched., C: Helped to some extent., D: Helped a lot.,

Table 8.34: The distribution of farmers (only for those who watch "Our Green Land") by the level of benefits as a consequences of watching "Our Green Land" in order to make decision to adopt

Level of benefits	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
B	68	74	50
C	20	16	30
D	12	10	20

B: Did not get any although they watched., C: Helped to some extent., D: Helped a lot.,

gramme. Also, the language and the content of the programme should be tested and verified in order to make them simple and more comprehensible. This emphasises the necessity of feed back information from farmers which unfortunately is missing in Syria. It is essential that all those concerned with the development of the farming community should assess the effectiveness of their communication processes.

4. Agricultural advertisements or "spots"

Spots are a short announcement for farmers on television that make different points for farmers, such as encouraging them to buy new seeds from the Government; which is the right time of applying chemical fertilizers, herbicides, pesticides; giving warning to farmers that a particular pest, insects, disease etc. will strike at a particular time. They, also, warn about the weather such as rainfall, frost etc.

The majority of farmers, 68.3%, were found to be aware of the existence of the advertisements while 31.7% never heard of them. None of the farmers who were aware of the advertisements were found not to be watching them. However, in general, 31.7% of the farmers did not watch television advertisements, 18.3%, 16.7% and 33% were found to be watching them "rarely", "sometimes", and "regularly" respectively, Tables 8.35 and 8.36.

Only those farmers who were watching the advertisements or spots were found to know about the purpose of the spots.

In Zone1, only 14.3% of the HIGH adopters were found to be unaware of the existence of the advertisements compared to 26.1% and 40% of the MEDIUM and LOW adopters respectively. In Zone2, 66.7% of the HIGH adopters were found to be not aware of the existence of the spots because they have no electricity therefore they have no television, compared to 25% and 44.4% of the MEDIUM and LOW adopters respectively, Table 8.37 and 8.38.

In both zones, a positive association was found between watching television advertisements by farmers and their Adoption Behaviour Scores, r=0.5101 and r=0.0385 for Zone1 and Zone2 respectively. The degree

Table 8.35: The distribution of farmers by their awareness of the agricultural television advertisements

Awareness	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Not aware	31.7	27.5	40.0
Aware	68.3	72.5	60.0

Table 8.36: The distribution of farmers by their habit of watching the agricultural advertisements

Habit of watching	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Could not watch	26.7	17.5	45.0
Did not watch	5.0	7.5	0.0
Rarely	18.3	25.0	5.0
Sometimes	16.7	20.0	10.0
Always	33.3	30.0	40.0

Table 8.37: The distribution of HIGH, MEDIUM and LOW adopters according to their awareness of agricultural advertisements

Awareness	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Not aware	14.3	26.1	40.0	66.7	25.0	44.4
Aware	85.7	73.9	60.0	33.3	75.0	55.6

of association in Zone1 was significant at $p<0.01$ while a very weak relation was found in Zone2. Again this weak association in Zone2 might be caused by the fact that the majority of the HIGH adopters have no television to watch.

Concerning the perception of agricultural advertisement by farmers, it seems that most of the farmers were very happy with them but others made some indirect complaint. Here are what some farmers commented about the advertisements or spots: "Spots are an excellent method of communication, but those responsible in providing inputs did not enable us to obtain the inputs. We cannot do what is communicated".

Thirty two percent of the farmers have not been helped by the advertisements in order to make their decision to adopt innovations simply because they do not watch the advertisements. Only 12% of the farmers who did watch the advertisements reported that they "did not get any help from them in order to make their decision to adopt innovations", compared to 24% and 63% who reported that they have "benefited to some extent" and "benefited a lot" respectively, Table 8.39 and 8.40.

8.3.3.2 Radio

1. General

   Although very few farmers, 5%, did not have a radio set at home 38% of them "did not listen to it at all", compared to 45% who listened "rarely", 10% "listen for some time" and only 7% listened "regularly", Table 8.41.

   In Zone1, none of the HIGH adopters "did not listen to radio at all", compared to 30.4% of the MEDIUM adopters and 30% of the LOW adopters. In Zone2, 66.7% of the HIGH adopters "did not listen to radio" compared to 50% and 77.8% of the MEDIUM and LOW adopters respectively, Table 8.42.

2. "Our Good Nature Land"

Table 8.38: The distribution of HIGH, MEDIUM and LOW adopters according to their habit of watching agricultural advertisements

Habit of	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
watching	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Could not watch	0.0	13.0	40.0	66.7	25.0	44.4
Did not	14.3	13.0	0.0	0	0.0	0.0
Rarely	0.0	35.0	20.0	0	12.5	0.0
Sometimes	14.3	17.4	20.0	0	12.5	22.2
Always	71.4	21.7	20.0	33.3	50.0	33.3

Table 8.39: The distribution of farmers by the level of benefits that they have received from agricultural advertisements

Level of benefits	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
A	31.7	27.5	40.0
B	8.3	10.0	5.0
C	16.7	17.5	15.0
D	43.3	45.0	40.0

A: Did not get any because not watching., B: Did not get any although they watched., C: Helped to some extent., D: Helped a lot.

Table 8.40: The distribution of farmers (only those who watch the spots) by the level of benefits that they have received as a consequences of watching agricultural advertisements

Level of benefits	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
B	12	14	8
C	24	24	25
D	63	62	67

B: Did not get any although they watched., C: Helped to some extent., D: Helped a lot.

Table 8.41: The distribution of farmers by their habit of listening to radio

Habit of listening	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Did not	38	25	65
Rarely	45	60	15
Sometimes	10	10	10
Always	7	5	10

Although all farmers who listened to radio were found to be aware of the existence of "Our Good Nature Land", (see Chapter 4), 51% of them "did not listen to it at all". In general terms, the percentage of farmers who did not listen to the programme, including those who did not listen to radio, were found to be 70%, compared to 18.3%, 11.7% and 0% who listened to it "rarely", "sometimes" or "regularly" respectively, Table 8.43.

Only 38% of the farmers who were aware of the existence of "Our Good Nature Land" were found to know the purpose of the programme, i.e they were fully aware of its role. This would bring the total percentage of farmers who were really aware of the programme to only 23%.

In Zone1, the percentage of HIGH adopters who "did not listen at all" to the programme was found to be 28.6% compared to 73.9% and 80% of the MEDIUM and LOW adopters respectively. In Zone2, 66.7% of the HIGH adopters did not listen to "Our Good Nature Land" compared to 62.5% and 88.9% of the MEDIUM and LOW adopters respectively, Table 8.44.

A positive association was found between the habit of listening to "Our Good Nature Land" by farmers and their Adoption Behaviour Scores, $r=0.4120$ and $r=0.1564$ for Zone1 and Zone2 respectively. In Zone1 the degree of association was found to be significant at $p<0.01$ while a weak association was found in Zone2, Table 8.62.

Concerning the perception of "Our Good Nature Land", in general terms it is similar to what has been said about television programme "Our Green Land", i.e. farmers comments about television programme can be applied to the radio programme too.

Most of the farmers, 70%, have not been helped by the programme in making their decision to adopt innovations simply because they did not listen to it. However, 72% of the farmers who listened to the programme reported that they have "never been helped by it in making a decision to adopt innovations" while 28% reported that they have "been helped to some extent in their decision", Tables 8.45 and

Table 8.42: The distribution of HIGH, MEDIUM and LOW adopters according to their habit of listening to radio

Habit of	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
listening	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Did not	0.0	30.4	30.0	66.7	50.0	77.8
Rarely	57.1	56.5	70.0	33.3	25.0	0.0
Sometimes	42.9	4.4	0.0	0.0	12.5	11.1
Always	0.0	8.7	0.0	0.0	12.5	11.1

Table 8.43: The distribution of farmers by their habit of listening to "Our Good Nature Land"

Habit of	% of farmers in	% of farmers in	% of farmers in
listening	both zones (60)	Zone1 (40)	Zone2 (20)
Did not	70.0	67.5	75.0
Rarely	18.3	20.0	15.0
Sometimes	11.7	12.5	10.0
Always	0.0	0.0	0.0

Table 8.44: The distribution of HIGH, MEDIUM and LOW adopters according to their habit of listening to "Our Good Nature Land"

Habit of	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
listening	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Did not	28.6	73.9	80.0	66.7	62.5	88.9
Rarely	28.6	17.4	20.0	33.3	25.0	0.0
Sometimes	42.9	8.7	0.0	0.0	12.5	11.1
Always	0.0	0.0	0.0	0.0	0.0	0.0

8.46.

3. Conclusion

Unfortunately, radio which is counted to be the most powerful medium in breaking the geographical barrier and reaching everybody everywhere seems to be neglected by most farmers. A lot of farmers did not listen to radio in general and did not listen to the farming programme "Our Good Nature Land". Above all very few farmers who listened to radio or its programme were found to be listening regularly. This could be related to the introduction of television which makes radio unpopular among other media. However, since it was shown that there was a relationship between the Adoption Behaviour Scores of farmers and their listening to the radio programme farmers should be encouraged to listen to radio in general and to "Our Good Nature Land" in particular. This could be achieved through introducing a good and popular programme which particularly related to agriculture, changing the time of broadcasting "Our Good Nature Land", pre-testing the language and the content of the programme and making an efficient use of a feed back information system, and emphasising what has been said in the programme by using face to face communication by Extension workers. This would help farmers in understanding the message as well as to make feed back of information possible.

8.3.3.3 Extension Publications

The majority of farmers, 72%, were found to be not aware even of the existence of extension publications. Not all of farmers who were aware of the existence of publications were found to read them. Only 59% of the farmers who were aware of the existence of the publications were found to read them while 41% did not read them often because the publications were not available to them. In general terms, the percentage of farmers who did not read the Extension publications were found to be 83.3% compared to 15%, 0% and 1.7% who read them "rarely", "sometimes" or "regularly" respectively, Tables 8.47 and 8.48.

Only 12% of the farmers who were aware of the existence of the publi-

Table 8.45: The distribution of farmers by the level of benefits that they received from "Our Good Nature Land"

Level of benefits	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
A	70.0	67.5	75.0
B	21.7	20.0	25.0
C	8.3	12.5	0.0
D	0.0	0.0	0.0

A: Did not get any because not listening., B: Did not get any although they listened., C: Helped to some extent., D: Helped a lot.

Table 8.46: The distribution of farmers (only for those who listen to "Our Good Nature Land") by the level of benefits as a consequence of their listening to "Our Good Nature Land"

Level of benefits	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
B	72	62	100
C	28	38	0
D	0	0	0

B: Did not get any although they listened., C: Helped to some extent., D: Helped a lot.

cations were found to be unaware of the purpose of them. This would bring the total percentage of farmers who were not really aware of the publications or they did not know what they were for to 75% of the farmers.

In Zone1, the percentage of the HIGH adopters who were found to be aware of the existence of Extension publications were found to be 57.1% compared to 21.7% and 0% of the MEDIUM and LOW adopters respectively. In general terms, over half of the HIGH adopters, 57.2%, most of the MEDIUM adopters, 87%, and all the LOW adopters were found to be not reading the publications. In Zone2, 67% of the HIGH adopters were found to be aware of the existence of the Extension publications compared to 50% and 22% of the MEDIUM and LOW adopters respectively, Tables 8.49 and 8.50.

In Zone1, a positive and significant association was found between the habit of reading the Extension publications by farmers and their Adoption Behaviour Scores, $r=0.3663$ which is significant at $p<0.05$ level. In Zone2, a negative and very weak relation was found between the habit of reading the Extension publications by farmers and their Adoption Behaviour Scores. This might be affected by the fact that none of the HIGH adopters did read any type of publication, Table 8.62.

Concerning the perception of Extension publications, farmers said: "I am very keen to read them but unfortunately, I have no access to them". "I think, publications are designed for Extension workers but not for farmers, they are difficult to understand".

In general, however, most farmers, 83.3%, "have not been helped" by Extension publications for making their decision to adopt innovations simply because they did not read them. Also, 30% of farmers who read the publication reported that they "benefited nothing" from reading them, other 30% reported that they "have benefited to some extent" and 40% reported that they "have benefited a lot", Tables 8.51 and 8.52.

However, it can be concluded that a very limited number of farmers had benefited from the publications. Reasons for this were mainly the fact that farmers were not aware of the publications, they were not available because no particular organization is responsible for diffusing these publications, the

Table 8.47: The distribution of farmers by their awareness of the Extension publications

Awareness	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Were not aware	72.0	77.5	60.0
Aware	28.0	22.5	40.0

Table 8.48: The distribution of farmers by their habit of reading Extension publications

Habit of reading	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Could not read	45.0	45.0	45.0
Did not read	38.3	40.0	35.0
Rarely	15.0	12.5	20.0
Sometimes	0.0	0.0	0.0
Always	1.7	2.5	0.0

Table 8.49: The distribution of HIGH, MEDIUM and LOW adopters according to their awareness of Extension publications

Awareness	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Were not aware	42.9	78.3	100.0	33.3	50.0	77.8
Aware	57.1	21.7	0.0	66.7	50.0	22.2

Table 8.50: The distribution of HIGH, MEDIUM and LOW adopters according to their habit of reading Extension publications

Habit of	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
reading	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Could not read	14.3	43.5	70.0	33.3	25.0	66.7
Did not read	42.9	43.5	30.0	66.7	37.5	22.2
Rarely	28.6	13.0	0.0	0.0	37.5	11.1
Sometimes	0.0	0.0	0.0	0.0	0.0	0.0
Always	14.3	0.0	0.0	0.0	0.0	0.0

Table 8.51: The distribution of farmers by the level of benefits that they have received from Extension publications

Level of benefits	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
A	83.3	87.5	75.0
B	5.0	0.0	15.0
C	5.0	5.0	5.0
D	6.7	7.5	5.0

A: Did not get any because not reading., B: Did not get any although they read., C: Helped to some extent., D: Helped a lot.

high level of illiteracy among farmers and the language and the quality of the publications themselves. Considering these reasons thoughtfully might provide the solution for maximizing the benefits from these publications which might lead to an increase in the adoption of the related innovations.

8.3.3.4 Agricultural Extension Film show

This is a mobile cinema, it is organised by the Extension Directorate through the Department of Media and Agricultural Information, Section of the Agricultural Cinema. The Agricultural Cinema has its own programme and moves from one village to another to show different types of agricultural activities to farmers. Of course the activities shown to farmers are related to what they are growing. The programme of the cinema could convey new techniques or stress improved practices and innovations.

More than half of the farmers, 51.7%, were found to be unaware of the existence of the Extension film show while 48.3% were found to be aware of it. Not all of farmers who were aware of the existence of the Extension film show were found to be involved in it, i.e. attended it. Only 68% of the farmers who were aware of the Extension film show were found to "have attended". In general terms, the majority of farmers, 70%, were found to have "not attended". All farmers who were involved were found to be "rarely" involved in the show, Table 8.53 and 8.54.

Only 25% of the farmers who were aware of the existence of the film show were found to know of its purpose.

In both zones, a positive but not significant association was found between farmers involvement in the Extension film shows and their Adoption Behaviour Scores, r=0.1667 and r=0.1621 for farmers in Zone1 and farmers in Zone2 respectively. This could be related to the low level of farmer involvements in the show, all farmers were found to be involved rarely; that is only once or twice as a maximum and that a long time ago.

Concerning the perception of the Extension film show, the majority of farmers, 70%, have not been helped by the film show in making their decision to adopt innovations, simply because they were not involved. Also 28% of the farmers who were involved reported that they "did not get any benefit" from involvement in the show, while 72% reported that "they got some

Table 8.52: The distribution of farmers (only those who read Extension publications) by the level of benefits in decision making that they have received as a consequences of reading them

Level of benefits	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
B	30	0	60
C	30	40	20
D	40	60	20

B: Did not get any although they read., C: Helped to some extent., D: Helped a lot.

Table 8.53: The distribution of farmers by their awareness of the existence of the Agricultural Extension film show

Awareness	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Were not aware	51.7	52.5	50.0
Aware	48.3	47.5	50.0

Table 8.54: The distribution of farmers by their involvement in the Agricultural Extension film show

Involvement	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Were not	70.0	72.5	65.0
Rarely	30.0	27.5	35.0
Sometimes	0.0	0.0	0.0
Always	0.0	0.0	0.0

benefits", Tables 8.55 and 8.56.

In conclusion, the agricultural extension film show did not show a significant relation with the Adoption Behaviour Scores of farmers. This might be, as has been discussed, because of the little involvement for farmers in the shows which did not affect their adoption behaviour to a great extent. However, since the indicator of better adoption behaviour pointed towards farmers who were involved in the show, improving the exposure of farmers to more shows might lead to an improvement in their adoption behaviour.

8.4 Neighbour

Neighbour encompasses other contact with farmers. It is not necessarily a person who just lives or farms beside the farmer. Only 3.3% of the farmers did not exchange visits with their "neighbours", 25%, 21.7% and 50% exchanged visits with neighbour "rarely", "sometimes" or "regularly" respectively, Table 8.57.

In Zone1, a very slight difference in exchanging visits with neighbours were found among the HIGH, MEDIUM and LOW adopters where all the HIGH and LOW adopters and most of the MEDIUM adopters, 95.6%, were found to be exchanging visits with their neighbours. In Zone2, also all the HIGH and MEDIUM adopters were found to be exchanging visits with their neighbours compared to 87.5% of the MEDIUM adopters, Table 8.58.

Not all farmers who exchanged visits with their "neighbour" were found to be discussing agricultural matters with them. Also, not all farmers who discussed agricultural matters with "neighbours" were found to be discussing these matters regularly. Just above twenty three percent of the farmers (including those who did not exchange visits with their neighbours) did not discuss any agricultural affairs with "neighbours", 33.3% and 43.3% discussed agriculture "sometimes" or "regularly" respectively, Table 8.59.

In Zone1 only 14.3% of the HIGH adopters did not discuss agricultural affairs with "neighbours" compared to 21.7% and 50% of the MEDIUM and LOW adopters respectively. In Zone2, none of the HIGH and MEDIUM adopters were found not to discuss agricultural affairs with their neighbours compared to 33.3% of the LOW adopters, Table 8.60.

In Zone1, a positive and weak relation was found between farmers' habit

Table 8.55: The distribution of farmers by the level of benefit that they received from the Agricultural Extension film show

Level of benefit	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
A	70.0	72.5	65.0
B	8.3	7.5	10.0
C	21.7	20.0	25.0
D	0.0	0.0	0.0

A: Did not get any because not involved., B: Did not get any although they attended., C: Helped to some extent., D: Helped a lot.

Table 8.56: The distribution of farmers (only for those who attended the film show) by the level of adoption behaviour benefit that they received from their attendances at the film show

Level of benefit	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
B	28	27	29
C	72	73	71
D	0	0	0

B: Did not get any although they were involved., C: Helped to some extent., D: Helped a lot.

Table 8.57: The distribution of farmers by their visits to their neighbours

Exchanging visit	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Did not	3.3	2.5	5.0
Rarely	25.0	35.0	5.0
Sometimes	21.7	25.0	15.0
Always	50.0	37.5	75.0

Table 8.58: The distribution of HIGH, MEDIUM and LOW adopters according to exchange visits with their neighbour

Exchanging	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
visit	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Did not	0.0	4.4	0.0	0.0	12.5	0.0
Rarely	28.6	39.1	30.0	33.3	0.0	0.0
Sometimes	0.0	21.7	50.0	0.0	25.0	11.1
Always	71.4	34.8	20.0	66.7	62.5	88.9

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

Table 8.59: The distribution of farmers by the discussion of agricultural affairs with their neighbours

Discussing agriculture with neighbour	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Did not discuss	23.3	27.5	15.0
Rarely	0.0	0.0	0.0
Sometimes	33.3	40.0	20.0
Always	43.3	32.5	65.0

Table 8.60: The distribution of HIGH, MEDIUM and LOW adopters according to their discussion of agricultural affairs with neighbours

Discussing agriculture with neighbour	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Did not	14.3	21.7	50.0	0.0	0.0	33.3
Rarely	0.0	0.0	0.0	0.0	0.0	0.0
Sometimes	28.6	47.8	30.0	33.3	25.0	11.1
Always	57.1	30.4	20.0	66.7	75.0	55.6

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

of exchanging visits with neighbours and their Adoption Behaviour Scores, r=0.1962. In Zone2 a negative relation was found between the habit of exchanging visit with neighbour by farmers and their Adoption Behaviour Scores, r=-0.3243. This might give a weak indication that HIGH adopters were less sociable people than LOW adopters in Zone2. However, in both zones the relation between discussing agricultural affairs with neighbours and the Adoption Behaviour Scores of farmers were found to be positively but not significantly related, r=0.2546 and r=0.1856 for Zone1 and Zone2 respectively. This might give some indication that farmers who talked with each others about farming have benefited from each other.

8.5 Farmers choice of the future communication method

Farmers were asked to select which method they feel would be more effective for them in the future.

Only 7% of the farmers did not mention any of the eleven methods which were "Extension worker", "cooperative", "Extension plot", "television", "radio", "publications", "leadership or neighbour", "Extension film show", "study tour", "field day" and "training course". Taking the cumulative number of farmers who have chosen each of the eleven communication methods, the method which has been selected most by farmers was the "Extension worker", followed by the "Extension plot", then by "leadership or neighbour" and the lowest one was "field day" and "the study tour", Table 8.61.

8.6 Conclusion

1. Summary and conclusion about Communicational factors

   The relation, particularly in Zone1, exists between the exposure of farmers to the source of innovations information and the adoption behaviour of farmers, see Table 8.62. Farmers were found to utilize different sources or channels for obtaining the knowledge about innovations. These sources, or channels which have been examined were, "Extension workers", "cooperatives", "Extension field demonstration or plot", "neighbours" and "mass media" such as television programme, radio programme, film show, publications etc.

Farmers awareness of these sources or channels for obtaining knowledge about innovations for a fairly large percentage of the farmers was found very low. The percentage of farmers who were aware of "Extension workers" were found to be, 80%, "Extension plot", 48%, "study tour", 2%, "field day", 2%, "farmers training", 7%, "television programme", 67%, "advertisements", 68%, "radio programme", 23%, "publications", 25%, "film show", 12%, and "cooperative", 78%. Some of the farmers who were not aware of these channels did not even know about their existence and some have heard about the existence of these channels or sources of information but they did not know what these channels were for. There is little real difference between farmers who heard of them but did not know what they were for and those who had not heard of them.

Farmers who were fully aware of these channels or sources and their purposes but were not involved had different reasons for not dealing with the activities and this could be related to farmers' attitudes towards them.

Farmers who dealt with the channels were found to face great difficulties in obtaining knowledge about innovations. Most of these difficulties were found to come from weakness in these channels themselves such as the comprehensibility of the message, the content, the time, the language, the accessibility, etc.

Given these circumstances, unfortunately, very few farmers have benefited from these sources or channels for the knowledge of innovations. Therefore, in order to maximize the benefit of these sources by farmers the following should be considered:

First, farmers have to be informed about every source of knowledge and have explained to them the purpose of these sources and encourage them to make the maximum use of those sources. Secondly Extension workers should increase their contact with farmers and work with them. Thirdly, farmers also should be encouraged to make more contact with Extension and report difficulties that they face. Fourthly,

improving the quality and the accessibility of mass media, i.e. the comprehensibility of the message, the content of the message, the language, the time and the availability of the publication. Fifthly, repeating the message through different channels. Sixth, the combination of the mass media with interpersonal channels might achieve better understanding of the message. Lastly and most importantly is the feed back which is necessary for making every source of knowledge more effective.

Knowledge of innovations seems to be a crucial factor for the adoption behaviour of farmers in Zone1. In Zone2 Adoption Behaviour Scores appear to be less influenced by knowledge. They may have knowledge but do not adopt, this might be due to climatic factors. This might indicate that farmers in Zone2 have specific problems, in addition to what has been indicated in previous chapters, which are not identified yet. Some of these factors have already been discussed in the previous chapters and some are still to be discussed. The next chapter is going to concentrate on the farmers themselves in order to investigate how certain factors affect farmers for the predisposition of the up take of the innovations.

Concerning the inter-relationships among the related factors of the Communicational factors in Zone1, all the inter-relationships were found to be positive and the majority of them were found to associate significantly but the level of significancy was rather low. This would suggest the importance of all of the related factors and this also would give an indication that farmers who for example have contact with Extension agent were most likely to be found listening to radio programmes, watching television programmes and advertisements, reading Extension publications, and were more involved in Extension plot and cooperative activities, (see Appendix C)

2. Inter-relationships between the Communicational and Personal and Socio-Economic factor

   Most of the relationships between the related factors of the Commu-

nicational factors and the related factors of the Personal and Socio-Economic factors were found to be positive while less than half of the relationships were found to be significant but at a rather low level. Also this would give an indication that farmers who have a better position of seeking information have also better characteristics for adoption on the Personal and Socio-Economic variables, (see Appendix C).

3. Inter-relationships between the Communicational and Economic and Institutional factors

   Also, most of the relationships between the related factors of the Communicational factors and the related factors of the Institutional and Economic factors were found to be positive while less than half of that relations were found to be significant but at a rather low level. This would give an indication that farmers who were better in their communicational behaviour have also better characteristics on the Economic and Institutional variables, (see Appendix C).

Table 8.61: The distribution of farmers by their selection of future methods of communication

Method	% of farmers in both zones (60)		% of farmers in Zone1 (40)		% of farmers in Zone2 (20)		Rank
	No	Yes	No	Yes	No	Yes	
Ext. worker	47.0	53.0	50.0	50.0	40.0	60.0	1
Cooperative	70.0	30.0	62.5	37.5	85.0	15.0	6
Ext. plot	50.0	50.0	47.5	52.5	55.0	45.0	2
Television	65.0	35.0	65.0	35.0	65.0	35.0	4
Radio	68.0	32.0	67.5	32.5	70.0	30.0	5
Publication	83.0	17.0	82.5	17.5	85.0	15.0	8
Leadership	58.0	42.0	52.5	47.5	70.0	30.0	3
Film show	70.0	30.0	72.5	27.5	65.0	35.0	6
Study tour	98.0	2.0	97.5	2.5	100.0	0.0	12
Field day	98.0	2.0	97.5	2.5	100.0	0.0	12
Training	93.0	7.0	92.5	7.5	95.0	5.0	10
Self	83.0	17.0	85.0	15.0	80.0	20.0	8
None	93.0	7.0	92.5	7.5	95.0	5.0	10

Ext: Extension worker

Table 8.62: The relation between Communicational Factors and the Adoption Behaviour Scores of farmers

Communicational factors	Zone1 (40)		Zone2 (20)	
	r	p	r	p
1.Total sources of information	0.6878	<0.01	0.4020	NS
2.Farmer visits to Extension	0.5318	<0.01	0.4218	NS
3.Extension visits to farmer	0.5032	<0.01	0.2982	NS
4.(2+3)	0.6384	<0.01	0.3804	NS
5.Farmer visits to cooperative	0.4542	<0.01	0.1553	NS
6.Attending cooperative meetings	0.4875	<0.01	0.0979	NS
7.Involvement in Extension plot	0.6390	<0.01	0.1529	NS
8.Watching "Our Green Land"	0.4081	<0.01	0.3544	NS
9.Watching advertisements	0.5101	<0.01	0.0385	NS
10.Listening to "Our Good Nature Land"	0.4120	<0.01	0.1564	NS
11.Reading Extension publications	0.3663	<0.05	-0.0998	NS
12.Exchanging visit with neighbours	0.1962	NS	-0.3243	NS
13.Discussing agri. with neighbours	0.2546	NS	0.1856	NS
14.Involvement in Extension film show	0.1667	NS	0.1621	NS
15.Involvement in study tour	0.2007	NS	0.0000	-
16.Involvement in field day	0.2917	NS	0.0000	-
17.All communicational factors	0.7246	<0.01	0.2869	NS

Table 8.63: Summary of the characteristics of the HIGH, and LOW adopters in relation to Personal and Socio Economic, Economic and Institutional, and Communicational variables

HIGH adopters	LOW adopters
HIGH adopters	LOW adopters
Zone1	
Have fragmented farms	Have consolidated farms
Have large family	Have small family
Live in extended family	Live in nuclear family
Literate	Illiterate
Have educated family	Have family which is not educated
Have well equipped farms	Have farms which are not well equipped
Have good road conditions	Have poor road conditions
Perceive the accessibility of innovations as easy	Perceive the accessibility of innovations as difficult
Own cash is available	Lack of own cash
Wheat is a cash crop for them	Wheat is more of a subsistence crop
Perceive the accessibility of Extension as easy	Perceive the accessibility of Extension as difficult
See that innovations are cheap	See innovation as expensive
All utilized four or more sources of information	Most utilized three sources or less
Most of them visit extension agent	Very few visit extension agent
Majority been visited by by extension agent	None was visited

Majority visit the cooperative	Few visit the cooperative
Most were involved in the extension plot	None were involved in the plot
Most watch television spots Regularly	Majority watch television spots but few watch regularly
Majority listen to radio occasionally	Most did not listen at all
Less than half read publications	None was reading publications
Zone2	
Third of them have farm size above 50 hectare	None has farm size above 50 hectare
Large family is more dominant	Average and small family are more dominant
Third are dependent completely on outside labour	None was dependent completely on outside labour
Third have their own farm equipment and machinery	Not at all
Own cash is relatively available	Have a shortage of own cash money
Many see innovations as cheap	Most see innovations as expensive

CHAPTER 9

The Syrian Farmers Studied:-Psychological Factors

The previous chapters have focused on the effects of the environmental and social conditions under which farmers live and interact on their adoption behaviour. This chapter, however, focuses on the farmers themselves, i.e. how their beliefs, attitudes and self images affect their adoption of farm innovations. It is recognised that to elicit these aspects from the farmers is not an easy task. Chapter 4 offers the method used which was either to present the farmers with statements and to examine the degree to which they agreed with the statements; or to ask the farmers to describe themselves and their work. The answers obtained in this systematic way are discussed in this chapter. They give a good insight into the attitudes and beliefs of the farmers. This open discussion with farmers encouraged them to express their deep held views and beliefs. It must be stressed that this is the first time these farmers will have experienced such an approach and the results are thus of great interest and potential importance.

The chapter is organised into four parts. Firstly; how farmers look to their spiritual beliefs. Secondly; how they look to the past. Thirdly; how they see their current situation and lastly; how they look to the future.

9.1 Spiritual component

Five sub components under this component were investigated and discussed. These are their beliefs in hard work, the degree to which they believe that money brings happiness, their view of the family as a burden, the degree to which they have a trusting nature and their view of fortune or luck. These aspects were chosen to cover a range of beliefs which might have some influence on farmers' behaviour.

The aim of this section is to investigate the effect of the spiritual component on the adoption behaviour of farmers. This was achieved by asking farmers their views about various statements.

9.1.1 "A very hard working man is good"

Farmers were asked for their comments about this statement and the degree to which they disagreed or agreed with it. A range of answers were obtained. Some said; "a very hard working man is great,... respectable,...competent", while others said: "a very hard working man is an animal,....stupid,....greedy".

The majority of farmers, 65%, agreed with the statement which says that "a very hard working man is good", 10% agreed in part and 25% disagreed, see Table 9.1.

In Zone1, the percentage of HIGH adopters who believed that "a very hard working man is good" was found only to be 42.9% compared to 60.9% and 70% of MEDIUM and LOW adopters respectively. In Zone2, only 33.3% of the HIGH adopters believed in the statement compared to all the MEDIUM adopters and 66.7% of the LOW adopters, Tables 9.2 and 9.3.

In both zones a negative association was found between the belief in hard work as expressed by the view that "a very hard working man is good" and the Adoption Behaviour Scores of farmers, r=-0.2116 and r=-0.3813 for Zone1 and Zone2 respectively. Both of these associations were found to be not significant. The fact that HIGH adopters appear to believe less in the statement may give an indication that the HIGH adopter farmers believe more in good management, planning and thinking rather than hard work itself as a means of achieving the best result.

9.1.2 "Money brings happiness"

Farmers were asked about their agreement or disagreement with this statement. Their replies include: "Money cannot bring happiness. The only one who can bring happiness to a man is God". "Of course money can bring happiness to every person. It is the horn of the man that can protect him from danger". "A man is worth what he has got in his pocket".

Less than half of the farmers, 38.3%, did not believe that money can

bring happiness, 35% agreed it would and 26.7% were found in between, Table 9.1.

In Zone1, all of the HIGH adopters believed that "money brings happiness" compared to 69.5% and 50% of the MEDIUM and LOW adopters respectively. In Zone2 also all of the HIGH adopters believed that money can bring happiness compared to 62.5% and 33.3% of the MEDIUM and LOW adopters respectively, Tables 9.2, and 9.3.

In both zones, a positive and significant relation was found between the belief that "money brings happiness" and the Adoption Behaviour Scores of farmers, r=0.3666 and r=0.4418 for Zone1 and Zone2 respectively. The associations were found to be significant at $p<0.05$ and $p=0.05$ respectively. These results suggest that HIGH adopters might have a higher belief in the value and usefulness of the money in bringing what they want and desire.

9.1.3 "My family is a burden to me"

The attitude to the family was assessed by asking farmers whether they agreed that "my family is a burden to me". Some farmers considered their family as a very heavy burden on them and some did not. Here are what some of them said: "My family is not a burden at all on me". "My family and I are a burden on God". "Although my family is very big, I see it as very small and not a burden at all". "I would be very happy if my three wives gave birth to babies every day". On the other hand some said: "My family is not large but it is a very heavy burden on me".

The majority of farmers, 60%, agreed that their family was a burden on them, only 23.3% considered their family as not a burden at all and 16.7% were found in between, see Table 9.1.

In Zone1 only 57.2% of the HIGH adopters said that their families was a burden on them compared to 73.9% and 80% of the MEDIUM and LOW adopters respectively. In Zone2 none of the HIGH adopters said that their family was a burden on them compared to 87.5% and 88.9% of the MEDIUM and LOW adopters respectively, Tables 9.2, and 9.3.

In both zones, a negative association was found between the degree of family burden and the Adoption Behaviour Scores of farmers, r=-0.3979 and r=-0.2444 for Zone1 and Zone2 respectively. The degree of association

was significant in Zone1 at $p<0.05$ while it was not in Zone2. This would suggest that the perception of the family burden decreased as the adoption behaviour of farmers increased, although the causal link is not established. It is also possible to suggest that the HIGH adopters have more income and hence the family was less of a burden to them.

Table 9.1: The distribution of farmers by some of the Spiritual Components

Statement	% of farmers in both zones			% of farmers in Zone1			% of farmers in Zone2		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1."A very hard working man is good"	65.0	10.0	25.0	60.0	12.5	27.5	75.0	5.0	20.0
2."Money brings happiness"	35.0	26.7	38.3	37.5	32.5	30.0	30.0	15.0	55.0
3."My family is a burden to me"	60.0	16.7	23.3	52.5	20.0	27.5	75.0	10.0	15.0

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree

Table 9.2: The distribution of the HIGH, MEDIUM and LOW adopters in Zone1 according to some of the Spiritual Components

Statement	Adopter category								
	HIGH %			MEDIUM %			LOW %		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1."A very hard working man is good"	42.9	14.3	42.9	60.9	13.0	26.1	70.0	10.0	20.0
2."Money brings happiness"	57.1	42.9	0.0	39.1	30.4	30.4	20.0	30.0	50.0
3."My family is a burden to me"	14.3	42.9	42.9	56.5	17.4	26.1	70.0	10.0	20.0

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree

9.1.4 "I am a trusting man"

The degree to which farmers recognize themselves as trusting was investigated as follows. The farmers were told a short story. This was; "If

Table 9.3: The distribution of the HIGH, MEDIUM and LOW adopters in Zone2 according to some of the Spiritual Components

Statement	Adopter category								
	HIGH %			MEDIUM %			LOW %		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1."A very hard working man is good"	33.3	0.0	66.7	100.0	0.0	0.0	66.7	11.1	22.2
2."Money brings happiness"	66.7	33.3	0.0	37.5	25.0	37.5	11.1	22.2	66.7
3."My family is a burden to me"	0.0	0.0	100.0	75.0	12.5	12.5	77.8	11.1	11.1

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree

somebody whom you have not met before comes in right now and tells you that there was a car crash in some place will you believe him?". Farmers' reactions to this story were recorded. Here are what some said:

"If I do not see by my eyes and touch by my hand, I would never believe in any stories or news". Others said; "Yes, of course I believe all I hear".

The percentage of farmers who see themselves as "trusting" and "very trusting" was found to be 38.3%, 36.6% see themselves as "not trusting" or "not trusting at all", and 25% were found in between, Table 9.4.

In Zone1, the majority of the HIGH adopters, 71.5%, perceived themselves as a "trusting" or "very trusting", compared to 30.5% and 70% of the MEDIUM and LOW adopters respectively. In Zone2, 33.3% of the HIGH adopters perceived themselves as "trusting" or "very trusting" compared to 37.5% and 11.1% of the MEDIUM and LOW adopters respectively, Tables 9.5 and 9.6.

In both zones a positive and weak association was found between the perception by farmers of being "trusting" and their Adoption Behaviour Scores, r=0.1360 and r=0.1833 for Zone1 and Zone2 respectively. This would suggest that this factor was not an important one in explaining farmers adoption behaviour.

9.1.5 "I am a lucky man"

The farmers were asked about luck. Here are some of the farmers comments about their fortune: "Look my son, I have very bad luck, if I dug a well inside the sea I would not get a drop of water". "Because of my bad luck, if I broadcast wheat seed, I would harvest weed seeds". Others were more positive, "I am a very lucky farmer, if I cultivate stones, I would harvest wheat".

Only a quarter of the farmers saw themselves as "fortunate" or "very fortunate", 26.7% saw themselves as "not fortunate" and 48.3% were found in between, Table 9.4.

In Zone1, about three quarters of the HIGH adopters, 71.4%, perceived themselves as "fortunate" or "very fortunate", compared to 26.1% and 20% of the MEDIUM and LOW adopters respectively. In Zone2, 33.3% of the HIGH adopters perceived themselves as "fortunate" or "very fortunate" compared to 12.5% and 11.1% of the MEDIUM and LOW adopters respectively, Tables 9.5 and 9.6.

In both zones a positive relation was found between the perception by farmers of being "fortunate" and their Adoption Behaviour Scores, r=0.3373 and r=0.3970 for Zone1 and Zone2 respectively. The degree of association in Zone1 was significant at $p< 0.05$ while in Zone1 was not. This would suggest that the perception of being fortunate increased as the adoption of the farm innovations increased. However, this factor of "fortunate" was found to relate negatively and significantly with the perception of the level of risk associated with innovations by farmers, as measured in section 9.3.3 of this Chapter, r=-0.3506. Thus the belief in fortune increased as the perception of risk associated with innovations decreased. This might play some role in the adoption of innovations by encouraging farmers who see themselves "fortunate" to adopt because they might believe that their luck would not leave them when trying new things and thus they would succeed.

9.1.6 Summary and conclusion on Spiritual Components

Five spiritual sub components with possible relationships to the Adoption Behaviour Scores of farmers were investigated. These were their belief in hard work, the degree to which the farmers think money brings happiness,

Table 9.4: The distribution of farmers by some of the Spiritual Components

Statement	% of farmers in both zones					% of farmers in Zone1					% of farmers in Zone2				
	* 1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
"I am a trusting man"	13.3	23.3	25.0	30.0	8.3	17.5	15.0	20.0	35.0	12.5	5.0	40.0	30.0	20.0	5.0
"I am a lucky man"	15.0	11.7	48.3	23.3	1.7	12.5	10.0	47.5	30.0	20.0	20.0	15.0	50.0	10.0	5.0

* 1: not at all; 2: just not; 3: neutral; 4: much; 5: very much

Table 9.5: The distribution of HIGH, MEDIUM and LOW adopters in Zone1 according to some of the Spiritual Sub Components

Statement	HIGH adopters					MEDIUM adopters					LOW adopters				
	* 1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
"I am a trusting man"	0.0	0.0	28.6	42.9	28.6	21.7	21.7	26.1	26.1	4.4	20.0	10.0	0.0	50.0	20.0
"I am a lucky man"	0.0	0.0	28.6	71.4	0.0	8.7	17.4	47.8	21.7	4.4	30.0	0.0	50.0	20.0	0.0

* 1: not at all; 2: just not; 3: neutral; 4: much; 5: very much

Table 9.6: The distribution of HIGH, MEDIUM and LOW adopters in Zone2 according to some of the Spiritual Sub Components

Statement	HIGH adopters					MEDIUM adopters					LOW adopters				
	* 1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
"I am a truusting man"	33.3	0.0	33.3	0.0	33.3	0.0	37.5	25.0	37.5	0.0	0.0	55.6	33.3	11.1	0.0
"I am a lucky man"	33.3	0.0	33.3	0.0	33.3	0.0	0.0	87.5	12.5	0.0	33.3	33.3	22.2	11.1	0.0

* 1: not at all; 2: just not; 3: neutral; 4: much; 5: very much

the farmers view of the family as a burden, the trusting nature of of the farmers and their view of fortune or luck.

In Zone1, three out of the five sub components were related significantly with the Adoption Behaviour Scores of farmers at $p<0.05$. There were; "money brings happiness", "my family is a burden to me", and "I am a lucky man".

In Zone2, only the "money brings happiness" sub component was found to relate significantly with the Adoption Behaviour Scores of farmers, at $p=0.05$.

Table 9.7: The relation between some of the Spiritual Components and the Adoption Behaviour Scores of farmers

Statement	Zone1 (40)		Zone2 (20)	
	r	p	r	p
1."A very hard working man is good"	-0.2116	NS	-0.3813	NS
2."Money brings happiness"	0.3666	<0.05	0.4418	0.05
3."My family is a burden to me"	-0.3979	<0.05	-0.2444	NS
4."I am a trusting man"	0.1360	NS	0.1833	NS
5."I am a lucky man"	0.3373	<0.05	0.3970	NS

r: Correlation Coefficient, p: Probability

All the correlations were however found to be relatively low and this would suggest while these factors may have a part to play in the adoption behaviour of farmers, they do not appear of major importance.

Also, the inter-relationships among the sub components were found to be low and not significant, see Appendix C. This would suggest that the individual sub components are independent one from another. It would appear that the Spiritual Component as measured is not an integrated or coherent component in terms of explaining farmers' behaviour to adoption.

9.2 Ancestor and the Past component

The aim of this section is to investigate the effect of traditionalism on the adoption behaviour of farmers. It is expected that traditionalism might act as a negative influence. This component was examined in two ways, firstly asking farmers' attitudes to statements, and secondly by investigating the degree to which the farmers used and followed certain agricultural practices.

Traditionalism of farmers was measured through six sub components. These were the "belief in superstition", "belief in omens", "belief in glorifying the traditional life", "belief in the view that some agricultural practices are demeaning", "belief that agricultural research is not necessary" and "the belief in agricultural proverbs".

9.2.1 "I believe that some agricultural practices are demeaning"

Farmers attitudes were investigated in the following way. Farmers were asked "Do you mind if you have to pull weeds from the field or to clean the coop or to milk the cow". This approach was used as in Syria all these jobs traditionally are considered to be the responsibility of women. A large percentage of farmers, 73.3%, stated that they did not mind doing these jobs, Table 9.8.

In Zone1, 28.6% of the HIGH adopter farmers believed that these jobs were demeaning compared to 8.7% and 10% of the MEDIUM and LOW adopters respectively. In Zone2, 33.3% of the HIGH adopters agreed that the jobs suggested were demeaning compared to 25% and 11.1% of the MEDIUM and LOW adopters respectively, Tables 9.9 and 9.10.

In both zones, a positive and weak relation was found between the belief in the view that some agricultural practices are demeaning and the Adoption Behaviour Scores of farmers, r=0.2394 and r=0.0899 for Zone1 and Zone2 respectively. This would suggest that the view that some tasks in agriculture were demeaning by itself was not an important explanatory factor for the adoption behaviour of farmers. However, the higher percentages of HIGH adopters who felt the jobs were demeaning might suggest that they appeared to believe in more job segregation between men and women than some of the LOW adopters. This has been confirmed by some of their comments while they were answering the question about the belief in demeaning practices.

Some felt that if they took part in the jobs done by women this would hurt their status among their peer groups and among other farmers. As a consequence this led them to adopt more new technologies in order not to be involved with women's jobs. The best example for this is the adoption of herbicides. This can be supported by some of their comments "I am ABO FOLAN (means father of somebody) and you ask me to clean the coop,.... to pull the weed... to milk the cow, do not be silly, women should do those, not myself because this is a part of their responsibility".

9.2.2 "I glorify in the traditional life"

The majority of the farmers, 63.3%, did not prefer the traditional way of living to their current life, 16.7% prefered the traditional life to their current life and 20% were found in between, Table 9.8.

When asked about their agreement with the statement "I glorify in the traditional life", in Zone1 more than half of the HIGH adopters, 57.1%, completely disagreed with the statement compared to 78.3% and 40% of the MEDIUM and LOW adopters respectively. In Zone2, 66.7% of the HIGH adopters and 66.7% of the LOW adopters disagreed with the statement compared to half of the MEDIUM adopters, Tables 9.9 and 9.10.

In both zones a negative and very weak relation was found between the belief in the traditional life, as reflected in glorifying in it and the Adoption Behaviour Scores of farmers, r=-0.1348 and r=0.0088 for Zone1 and Zone2 respectively.

9.2.3 "I am superstitious"

Less than half, 41.7% of the farmers "did not believe" in superstitions at all, 36.7% "did believe" and 21.7% were found in between, Table 9.8.

In Zone1, over half of the HIGH adopter farmers, 57.1%, "did not believe" in superstitions at all compared to 39.1% and 40% of the MEDIUM and LOW adopters respectively. In Zone2, only 33.3% of the the HIGH adopters "did not believe" in superstitions at all compared to 37.5% and 44.4% of the MEDIUM and LOW adopters respectively, Tables 9.9 and 9.10.

In both zones a negative but not a significant relationship was found

between the belief in superstitions and the Adoption Behaviour Scores of farmers, r=-0.2860 and r=0.-1815 for Zone1 and Zone2 respectively. This would suggests the weakness of this factor in explaining the adoption behaviour of farmers.

9.2.4 "I believe in omens"

Less than half, 41.7% of the farmers "did not believe at all" in omens, 38.3% "believed in them" and 20% were found in between, Table 9.8.

In Zone1, 42.9% of the HIGH adopters were found to "not believe" in omens compared to 43.5% of the MEDIUM adopters and 40% of the LOW adopters. In Zone2, 33.3% of the HIGH adopters "did not believe at all" in omens compared to 37.5% and 44.4% of the MEDIUM and LOW adopters respectively, Tables 9.9 and 9.10.

In both zones, a negative but not a significant association was found between the belief in omens and the Adoption Behaviour Scores of farmers, r=-0.1942 and r=-0.1815 for Zone1 and Zone2 respectively. This would suggest that this sub component was not effective in discriminating between HIGH and LOW adopters.

9.2.5 "Research is not necessary for agricultural development"

Here are some of the farmers' comments about their belief in research. They said: "We listen to agricultural research workers as well as Extension worker but this would not affect our attitude towards what they recommend or say at all". "We do what we would like to do". "Research and Extension is a backbone of any agricultural development".

A large percentage of farmers, 81.7%, believe that research can play an important role in the agricultural development, 11.7% believed it had a potential role to play and 6.7% did not believe it had a role at all, Table 9.8.

In Zone1, all the HIGH adopters believed that agricultural research is necessary for agricultural development, compared to 69.6% and 90% of the MEDIUM and LOW adopters respectively. In Zone2 also, all the HIGH adopters believed that research is necessary for agricultural development compared to 87.5% of the MEDIUM adopters and 77.8% of the LOW adopters, Table 9.9 and 9.10.

In both zones, a negative but not a significant association was found between the non belief in agricultural research and the Adoption Behaviour Scores of farmers, r=-0.0677 and r=-0.3702 for Zone1 and Zone2 respectively. Again the weakness of this component especially in Zone1 makes it as not an important factor for explaining the adoption behaviour of farmers.

9.2.6 "I keep and apply agricultural proverbs in my farming practice"

The degree to which farmers follow traditional agricultural proverbs is a likely measure of the degree to which the farmers hold to tradition.

Over half of the farmers, 56.7%, did not know any agricultural proverbs, while the rest did know some. Most of the farmers, 96%, who knew some of the agricultural proverbs were found to be regularly applying them in their farming practices, Table 9.11.

In Zone1, the percentage of the HIGH adopters who did not keep any proverb was found to be 42.9% compared to 47.8% and 70% of the MEDIUM and LOW adopters respectively. In Zone2, 66.7% of the HIGH adopters did not keep any proverbs compared to 50% and 66.7% of the MEDIUM and LOW adopters respectively, Table 9.12.

In both zones, a positive association was found between the degree to which farmers knew and applied the agricultural proverbs and the Adoption Behaviour Scores of farmers, r=0.3084 and r=0.2546 for Zone1 and Zone2 respectively. In Zone1 the association was significant at p=0.05 while in Zone2 it was not. This would suggest that the use of indigenous technical knowledge as expressed in proverbs, did not play an adverse role in the adoption of the recommended farm practices, and may in fact help farmers to adopt. This could be related to the coincidence in which the innovation recommendations correspond with the indigenous knowledge of farmers, (eg. "exchange your seed even with your neighbour", "take your living from well prepared soil", "the weather in March decides all", or "as you plant so you harvest"). Therefore, the effect on the adoption of innovations was positive, however, if the innovations were found not to correspond with the indigenous knowledge, one would not expect to have the same positive adoption result. It is true that many of the research results and recommendations do correspond closely to the agricultural proverbs frequently used in the area.

Table 9.8: The distribution of farmers by Ancestor and the Past Component

Statement	% of farmers in both zones (60)			% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1."I believe that some agr. practice are demeaning"	15.0	11.7	73.3	12.5	15.0	72.5	20.0	5.0	75.0
2."I glorify in the traditional life"	16.7	20.0	63.3	12.5	22.5	65.0	25.0	15.0	60.0
3."I am superstitious"	36.7	21.7	41.7	32.5	25.0	42.5	45.0	15.0	40.0
4."I believe in omens"	38.3	20.0	41.7	35.0	22.5	42.5	45.0	15.0	40.0
5."Research is not necessary for agricultural development"	6.7	11.7	81.7	10.0	10.0	80.0	0.0	15.0	85.0

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree

Table 9.9: The distribution of the HIGH, MEDIUM and LOW adopters in Zone1 according to the Ancestor and the Past Component

Statement	Adopter category								
	HIGH %			MEDIUM %			LOW %		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1."I believe that some agr. practices are demeaning"	28.6	28.6	42.5	8.7	8.7	82.6	10.0	20.0	70.0
2."I glorify in the traditional life"	14.3	28.6	57.1	8.7	13.0	78.3	20.0	40.0	40.0
3."I am superstitious"	14.3	28.6	57.1	34.8	26.1	39.1	40.0	20.0	40.0
4."I belive in omens"	14.3	42.9	42.9	39.1	17.4	43.5	40.0	20.0	40.0
5."Research is not necessary for agricultural dev."	0.0	0.0	100.0	17.4	13.0	69.6	0.0	10.0	90.0

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree

Table 9.10: The distribution of the HIGH, MEDIUM and LOW adopters in Zone2 according to the Ancestor and the Past Component

Statement	Adopter category								
	HIGH %			MEDIUM %			LOW %		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1."I believe that some agr. practices are demeaning"	33.3	0.0	66.7	25.0	12.5	62.5	11.1	0.0	88.9
2."I glorify in the traditional life"	33.3	0.0	66.7	25.0	25.0	50.0	22.2	11.1	66.7
3."I am superstitious"	33.3	33.3	33.3	50.0	12.5	37.5	44.4	11.1	44.4
4."I belive in omens"	33.3	33.3	33.3	50.0	12.5	37.5	44.4	11.1	44.0
5."Research is not necessary for agricultural dev."	0.0	0.0	100.0	0.0	12.5	87.5	0.0	22.2	77.8

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree

Here are some of the proverbs which were reported by farmers during this survey:

1. Proverbs about early planting

    - "Plants which are exposed to October star are yielding twenty times more".
    - "You have to sow your seeds while the land is dry even if you are warned that you will be hung if you do it".
    - " If you sow your seeds while the land is dry, the yield that you are going to get is very high".
    - "The first will win and the last will lose".
    - "Sowing into the wet soil yields nothing"

2. Proverbs about appropriate late planting in some areas

    - "Sowing the seeds after the first rainfall is yielding gold".
    - "You have to sow while the land is drying but do not forget to leave a part of your land to sow after it has rained three to four times".
    - If you sow your seed in January you get grain which is heavier".

3. Proverbs about tillage

    - "Sowing without seed bed preparation leads to nothing to harvest".
    - "Take your living from well prepared soil".
    - "A single cultivation at the right time is better than several at the wrong time".
    - "If the blade digs the land at the right time you will definitely harvest the fruit of action".
    - "The best yield you achieve from the hard land" i.e. land which not has been cultivated much.

4. Proverbs about amount of seed

- "To sow less seeds is like when you put no meat, but merely fat, in your sauce".

5. Proverbs about rainfall

   - "The weather in March decides all".
   - "The weather in April decides all".

6. Proverbs about exchanging seeds

   - "Exchange your seeds even with your neighbour".

7. Proverbs about serving farming

   - "As you plant so you harvest"
   - "Everythings in this life comes to exist by hope but agriculture comes by work".
   - "Apply more input in order to get more"
   - "If you serve your land properly, it will serve you, but otherwise it will laugh at you".

Table 9.11: The distribution of farmers by their keeping and applying agricultural proverbs

	% of farmers in both zones	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
Did not keep any	56.7	55.0	60.0
Kept and apply rarely	0.0	0.0	0.0
Kept and apply sometimes	1.7	2.5	0.0
Kept and apply always	41.7	42.5	40.0

Table 9.12: The distribution of HIGH, MEDIUM and LOW adopters according to their keeping and applying agricultural proverbs

	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
Did not keep any	42.9	47.8	70.0	66.7	50.0	66.7
Kept and apply rarely	0.0	0.0	0.0	0.0	0.0	0.0
Kept = = sometimes	0.0	0.0	0.0	0.0	0.0	0.0
Kept = = always	57.1	47.8	30.0	33.3	50.0	33.3

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

9.2.7 Summary and Conclusion on Past and Ancestor Component

Six sub components under Ancestor and the Past Component were investigated. These were; "demeaning practices", "glorifying traditional life", "superstion", "omens", "belief in research" and "agricultural proverbs".

The proverbs or indigenous knowledge and demeaning practices sub components were found to correlate positively with the Adoption Behaviour Scores of farmers. Only, the indigenous knowledge, in Zone1, was found to relate significantly. This would suggest that there is only a slight effect of the Ancestor and the Past Component, as measured, on the adoption behaviour of farmers. This result might appear surprising in view of other research suggesting that traditionalism is a limiting factor. It would appear that Syrian farmers are actually forward looking.

9.3 Current situation Component

Four major subjects under the Current Situation Component were investigated and studied. The farmers' "attitude towards rain-fed farming", farmers' "attitude to risk" and the farmers' "attitude towards innovations" were examined. Further studies were carried out on farmers' image of the "Self", (the Self-Concept).

9.3.1 Attitude of farmers towards rain-fed farming

Extracting farmers attitudes towards rain-fed farming was approached in two ways. First, directly, through asking farmers about the degree to which they like rain-fed farming as a way of earning a living. Second, indirectly,

Table 9.13: The relation between Ancestor and the Past Component and the Adoption Behaviour Scores of farmers

Statement	Zone1 (40)		Zone2 (20)	
	r	p	r	p
1."I believe that some agri. practice are demeaning"	0.2394	NS	0.0899	NS
2."I glorify in the traditional life"	-0.1348	NS	0.0088	NS
3."I am superstitious"	-0.2860	NS	-0.1815	NS
4."I believe in omens"	-0.1942	NS	-0.1815	NS
5."Research is not necessary for agri. dev".	-0.0677	NS	-0.3702	NS
6."I keep and apply agri. proverbs in my farming"	0.3084	0.05	0.1578	NS

r: Correlation Coefficient, p: probability

through asking them assuming that they had a free choice to select jobs, to place the priority of rain-fed farming among these jobs, i.e to rank these jobs according to their attractiveness. The jobs which were mentioned to farmers were "irrigated farming", "animal and poultry", "machinery", "trade", i.e seling and buying, "government employment" and "other self employment". This indirect measure was done because not all farmers who were interviewed were found to be owners of their land. Therefore, the group of farmers who do not own their land, especially those who got their land by the land reform law, might be reluctant to say for example "we do not like rain-fed farming" or "we do not like farming". This is because they may be afraid of the land being taken back from them. However, in the second method they can rank farming more freely with less worry because they have already shown their commitment to rain-fed farming by doing it, the farmers specific comments were also noted.

The results, showed that about half, 48.3%, of the farmers reported to "like rain-fed farming very much" when they were asked directly about their attitude, yet only 16.7% of them chose "rain-fed farming" as a first priority for earning a living when they were asked indirectly. Thirty five percent of the farmers have reported "rain-fed farming" as a second priority, 23.3% as a third priority, 11.7% as a fourth, 5% as a fifth and 8.3% have given no priority for the "rain-fed farming" if they had a free choice to select jobs, Tables 9.14, 9.15, 9.16, 9.17, and 9.18.

The most popular and liked job among farmers, when given a free choice, was found to be "irrigated farming". Eighty six percent "liked" or "liked it very much" and 60% ranked it as a first priority and 27% as a second priority. This is possibly because "irrigated farming" has a superiority of profitability over "rain-fed farming". This would give an indication that most farmers who had a negative attitude towards "rain-fed farming" had this attitude because of the low profitability of "rain-fed farming". This might suggest that making "rain-fed farming" more attractive through the increase in its profitability could be a big step in making farmers' attitude more favourable towards rain-fed farming.

In Zone1, the result for both methods, directly and indirectly, of prob-

Table 9.14: The distribution of farmers by their attitudes towards different jobs (direct way for measuring farmers attitude)

	% of farmers in both zones					% of farmers in Zone1					% of farmers in Zone2				
	dm	d	n	l	lm	dm	d	n	l	lm	dm	d	n	l	lm
Rainfed farming	8.3	3.3	11.7	28.3	48.3	2.5	7.5	17.5	35.0	37.5	15.0	0.0	0.0	15.0	70.0
Irrigated farming	1.7	6.7	5.0	8.3	78.3	2.5	10.0	2.5	7.5	77.5	0.0	0.0	10.0	10.0	80.0
Animal and poultry	5.0	26.7	3.3	11.7	53.3	7.5	30.0	2.5	12.5	47.5	0.0	20.0	5.0	0.0	65.0
Machinery	3.3	28.3	0.0	13.3	55.0	2.5	32.5	0.0	15.0	50.0	5.0	20	0	10	65
Trade	3.3	45.0	10.0	10.0	31.7	2.5	42.5	12.5	10.0	32.5	5.0	50.0	5.0	10.0	30.0
Government employment	3.3	51.7	6.7	18.3	20.0	2.5	55.0	10.0	17.5	15.0	5.0	45.0	0.0	20.0	30.0
Other self employment	1.7	80.0	0.0	3.3	15.0	2.5	87.5	0.0	2.5	7.5	0.0	65.0	0.0	5.0	30.0

dm: dislike very much, d: dislike, n: neutral l: like, lm: like very much,

Table 9.15: The distribution of farmers by the priority which they gave to "rain-fed farming" (indirect way of measuring farmers' attitude)

	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
First priority	16.7	22.5	5.0
Second =	35.0	42.5	20.0
Third =	23.3	17.5	35.0
Fourth =	11.7	7.5	20.0
Fifth =	5.0	5.0	5.0
Sixth =	0.0	0.0	0.0
Seventh =	0.0	0.0	0.0
No place	8.3	5.0	15.0

ing farmers attitudes, showed a positive association with the Adoption Behaviour Scores of farmers. The degree of association between farmers' attitude, measured directly, and the Adoption Behaviour Scores was found to be significant at the $p=<0.01$ level, $r=0.4473$, while the degree of association between farmers' attitude, measured indirectly, and the Adoption Behaviour Scores of farmers was found to be significant at $p<0.05$, ($r=0.3645$). In Zone2, indirect measurement of attitude showed a significant relation at $p<0.05$, $r=0.4808$, but direct measurement showed a weak association with the Adoption Behaviour Scores of farmers, $r=0.1009$, Table 9.19. This might suggest that as the degree of liking jobs, "rain-fed farming", increased, the adoption behaviour of farmers increased, the "causes" and the "effects" were not definitely established.

For each job the scores for each farmer were calculated by giving a score of 5 for "liking very much" down to 1 for "disliking very much". These scores were then analysed. Most of the farmers' attitudes towards other jobs, particularly in Zone1, were found to be negatively correlated with their Adoption Behaviours Scores i.e. the favourable attitude towards each other job decreased as the Adoption Behaviour Scores of the "rain-fed" innova-

Table 9.16: The distribution of the HIGH, MEDIUM and LOW adopters in Zone1 according to their attitudes towards different jobs (direct way of measuring farmers' attitude)

	% of H adopters					% of M adopters					% of L adopters				
	dm	d	n	l	lm	dm	d	n	l	lm	dm	d	n	l	lm
Rainfed farming	0.0	0.0	14.3	42.9	42.9	0.0	4.4	13.0	30.4	52.2	10.0	10.0	30.0	40.0	10.0
Irrigated farming	0.0	28.6	0.0	14.3	57.1	0.0	4.4	0.0	8.7	87.0	20.0	10.0	0.0	0.0	70.0
Animal and poultry	14.3	42.9	14.3	28.6	0.0	4.4	34.8	0.0	13.0	47.8	10.0	10.0	0.0	0.0	80.0
Machinery	0.0	57.1	0.0	28.6	14.3	4.4	34.8	0.0	13.0	47.8	0.0	10.0	0.0	10.0	80.0
Trade	14.3	14.3	0.0	28.6	42.9	0.0	56.5	8.7	4.4	30.4	0.0	30.0	30.0	10.0	30.0
Government employment	14.3	42.9	42.9	0.0	0.0	0.0	52.2	4.4	21.7	21.7	0.0	70.0	0.0	20.0	10.0
Other self employment	14.3	71.4	0.0	14.3	0.0	0.0	100.0	0.0	0.0	0.0	0.0	60.0	0.0	40.0	0.0

dm: dislike very much, d: dislike, n: neutral l: like, lm: like very much, H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

Table 9.17: The distribution of the HIGH, MEDIUM and LOW adopters in Zone2 according to their attitudes towards different jobs (direct way of measuring farmers attitude)

	% of H adopters					% of M adopters					% of L adopters				
	dm	d	n	l	lm	dm	d	n	l	lm	dm	d	n	l	lm
Rainfed farming	0.0	0.0	0.0	33.3	66.7	25.0	0.0	0.0	12.5	62.5	11.1	0.0	0.0	11.1	77.8
Irrigated farming	0.0	0.0	0.0	0.0	100.0	0.0	0.0	12.5	12.5	75.0	0.0	0.0	11.1	11.1	77.8
Animal and poultry	0.0	0.0	0.0	0.0	100.0	0.0	37.5	12.5	12.5	37.5	0.0	11.1	0.0	11.1	77.8
Machinery	0.0	33.3	0.0	33.3	33.3	0.0	25.0	0.0	0.0	62.5	11.1	11.1	0.0	11.1	66.7
Trade	0.0	100.0	0.0	0.0	0.0	12.5	25.0	0.0	12.5	50.0	0.0	55.6	11.1	11.1	22.2
Government employment	0.0	33.3	0.0	33.3	33.3	12.5	25.5	0.0	12.5	50.0	11.1	44.4	0.0	11.1	33.3
Other self employment	0.0	66.7	0.0	0.0	33.3	75.0	0.0	0.0	0.0	25.0	66.7	0.0	0.0	0.0	33.3

dm: dislike very much, d: dislike, n: neutral l: like, lm: like very much, H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

Table 9.18: The distribution of HIGH, MEDIUM and LOW adopters according to the priority which they gave to "rain-fed farming" (indirect way of measuring farmers' attitude)

	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
First priority	57.1	21.7	0.0	33.3	0.0	0.0
Second =	0.0	56.5	50.0	33.3	37.5	0.0
Third =	14.3	13.0	10.0	33.3	25.0	44.4
forth =	14.3	4.4	20.0	0.0	37.5	11.1
fifth =	14.3	4.4	0.0	0.0	0.0	11.1
Sixth =	0.0	0.0	0.0	0.0	0.0	0.0
Seventh =	0.0	0.0	0.0	0.0	0.0	0.0
No place	0.0	0.0	20.0	0.0	0.0	33.3

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

tion increased, i.e. adopters "like rain-fed farming". Some of the Adoption Behaviour Scores decreased significantly with a favourable attitude towards some other jobs such as the attitude towards animal and poultry raising and machinery and some did not. The total scores of farmers' attitude towards six jobs other than "rain-fed farming" (irrigated crops, animal and poultry raising, machinery, trading, Government employment, and other self employment outside agriculture) were calculated for every farmer, and then correlated with the Adoption Behaviour Scores of farmers, it showed a negative and significant association, r=-0.3720 and r=-0.0912 for Zone1 and Zone2 respectively. This would again confirm that as the favourable attitude towards other jobs increased the adoption behaviour of the related "rain-fed farming" innovations decreased.

9.3.2 Summary and Conclusion on Attitude to rain-fed farming

In conclusion, farmers' attitudes towards "rain-fed farming" was found to be related to the outcome of the adoption behaviours of farmers to some extent. The unfavourable attitude towards the "rain-fed farming" seems to be most likely to come from the low profitability rather anything else.

The more favourable the attitude towards "rain-fed farming" the farmer has the more likely for him to be found in a better position in adoption behaviour of the related rain-fed innovations.

Two issues were raised from the analysis of farmers' attitudes. Firstly, some farmers have a negative attitude towards "rain-fed farming" which is supported by the following statements which were reported by some farmers: "I am forced to perform this job, (they meant farming in general), if we could find the alternative to it we would leave it immediately", "My orientation was to be a successful mechanical worker but not as a farmer". Secondly, some farmers had a dispersed attitude. This dispersed attitude arises because many farmers want variety, for example, and do not want to specialize in "rain-fed farming". "I would like very much to perform as many as possible of the existing jobs in this world". Both of these phenomenon (negative and dispersed attitude) have affected significantly and adversely the adoption behaviours of farmers relating to "rain fed farming" although causal link is not clear. Farmers with negative attitudes did not perform well in the adoption of rain-fed innovations simply because they did not like to work in rain-fed agriculture. Farmers with dispersed attitude did not perform well in the adoption of innovations, not because they have negative attitude towards "rain-fed farming" but because they liked to perform many other jobs beside the "rain-fed farming". Therefore, this dispersion in attitudes made farmers ambivalent, and perform poorly in rain-fed agriculture and may be in other jobs as well.

9.3.3 Attitude to risk

It has to be admitted that rain-fed farmers are facing twofold difficulties in adopting innovations. Firstly, difficulties which come from uncertainty about the weather conditions and secondly those which come from uncertainty about the innovation itself, because of its newness (see Chapter 3). However, in reality, uncertainty of innovations can be reduced to a large extent but unfortunately weather conditions cannot be controlled. Therefore, under these circumstances for a farmer to be a risk taker could be a very crucial factor for the uptake of innovations.

Assessing farmers' risk taking was approached through two ways. The

Table 9.19: The relation between farmers attitude and the Adoption Behaviour Scores of farmers

	Zone1 (40)		Zone2 (20)	
	r	p	r	p
1.Rain-fed farming				
"direct measurement"	0.4473	<0.01	0.1009	NS
2.Rainfed farming				
"indirect measurement"	0.3645	<0.05	0.4808	<0.05
3.Irrigated farming	0.0622	NS	0.2182	NS
4.Animal & poultry	-0.3132	<0.05	0.0289	NS
5.Machinery	-0.4091	<0.01	-0.2068	NS
6.Trade	0.0446	NS	-0.1591	NS
7.Government Employment	-0.1499	NS	0.0690	NS
8.Self employment	-0.2824	NS	-0.0507	NS
9.Gross scores of				
(3+4+5+6+7+8)	-0.3720	<0.05	-0.0912	NS

first approach is by presenting farmers with two different types of statements. The first one measured farmers' risk taking directly, i.e through asking farmers' opinion about using new things for the first time. Examples of this are the use of new varieties and fertilizers and also items not related to agriculture, such as buying new radio or television etc. The second type of statement measures farmers' risk taking indirectly, i.e. farmers' risk taking can be inferred from that statement. Examples of this type of assessment include asking "the farmers for their view of being the first to adopt" and the view about the "speed of adoption". The second approach is through reported statements made by farmers talking about themselves such as "I cannot take risk", ... "I am not a risk taker".

9.3.3.1 Attitude to the "risk in innovations"

Farmers were asked about their attitudes to new things both inside and outside farming.

About half of the farmers, 48.3%, believed that the use of new ideas for the first time is "risky", 36.7% believed that it is "not risky at all", and 15% were found in between, Table 9.20.

In Zone1, none of the HIGH adopter famers believed that the use of new ideas for the first time is "completely risky" compared to 52.3% and 80% of the MEDIUM and LOW adopters respectively. In Zone2, also, none of the HIGH adopters believed that the use of new things for the first time is "completely risky" compared to 75% and 66.7% of the MEDIUM and LOW adopters respectively, Table 9.21.

In both zones, the perception of risks and the Adoption Behaviour Scores of farmers were found to be correlated negatively and significantly, r=-0.5817 and r=-0.4388 for Zone1 and Zone2 respectively. The degree of association was significant at $p<0.01$ in Zone1 while in Zone2 this was significant at $p=0.05$. This suggests that as the perception of adoption being a risky process increased, the adoption behaviour of farmers decreased.

9.3.3.2 Attitude to "being the first to adopt an innovation"

This approach measures risk taking by farmers and at the same time it measures something of the image level of farmers about themselves. This will be

Table 9.20: The distribution of farmers by agreement with risk statement

Statement	% of farmers in both zones (60)			% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
"Innovation is risky"	48.3	15.0	36.7	50.0	12.5	37.5	60.0	30.0	10.0

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree

Table 9.21: The distribution of the HIGH, MEDIUM and LOW adopters according to their agreement with risk statement

Zone	Statement	% of H adopters			% of M adopters			% of L adopters		
		Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1	"Innovation is risky"	0.0	14.3	85.7	52.3	13.0	34.8	80.0	10.0	10.0
2	"Innovation is risky"	0.0	66.7	33.3	75.0	25.0	0.0	66.7	22.2	11.1

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree, H: HIGH, M: MEDIUM, L: LOW

seen later in this chapter when the Self-Concept dimension of progressiveness is discussed.

The percentage of farmers who reported that they were "proud of being the first to adopt any released innovations" related to agriculture were found to be only 16.7%, 41.7% were found to be "not proud of being the first to adopt" and 41.7% were found in between, Table 9.22.

In Zone1 over half of the HIGH adopter farmers were found to be "proud of being the first to adopt any released innovation", compared to 8.7% and 0% of the MEDIUM and LOW adopters respectively. The percentage of the MEDIUM adopters who were found to be "not proud of being the first to adopt" was found to be 47.8%, compared to almost the same percentage of the LOW adopters, 50%. In Zone2, only 33.3% of the HIGH adopters were found to be "proud of being the first to adopt", compared to 25% and 11.1% of the MEDIUM and LOW adopters respectively, Table 9.23.

As might be expected in both zones, a positive relation was found between the view of being "proud to be the first to adopt any released in-

novations" and the Adoption Behaviour Scores of farmers, r=0.3922 and r=0.3339 for Zone1 and Zone2 respectively. The degree of association was significant at $p<0.05$ in Zone1 but it was not significant in Zone2. It is clear that farmers who adopt are in a stronger position to have something to be proud about. However, the results also suggest that as farmers valued more the esteem reward which they might get from their societies and associates by their adoption of the farm innovations, the more likely they were to adopt. This is confirmed by their freely made comments.

Table 9.22: The distribution of the farmers by their view of being the first to adopt an innovation

	% of farmers in both zones (60)	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
"Not proud of it"	41.7	40.0	45.0
"Neutral"	41.7	45.0	35.0
"Proud of it"	16.7	15.0	20.0

Table 9.23: The distribution of HIGH, MEDIUM and LOW adopters according to their view of being the first to adopt an innovation

	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
"Not proud of it"	0.0	47.8	50.0	33.3	50.0	44.4
"Neutral"	42.8	43.5	50.0	33.3	25.0	44.4
"Proud of it"	57.1	8.7	0.0	33.3	25.0	11.1

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

9.3.3.3 Attitude to "the speed of adoption"

Each farmer was asked to state the time lapse between him having knowledge of an innovation and the complete adoption of it by him. Only 28.3% of the farmers said that they would adopt the first year of the introduction of the innovation to them, 40% said the second year and 31.7% after three years and more, Table 9.24.

Table 9.24: The distribution of the farmers by their speed of adoption

Speed	% of farmers in both zones	% of farmers in Zone1 (40)	% of farmers in Zone2 (60)
"First year"	28.3	32.5	20.0
"Second year"	40.0	42.5	35.0
"Third and more"	31.7	25.0	45.0

In Zone1, all the HIGH adopters said that they would adopt in the first year of the introduction of the innovation to them, compared to 26.1% and 0% of the MEDIUM and LOW adopters respectively. In Zone2, only 33.3% of the HIGH adopters would adopt in the first year compared to 25% of the MEDIUM adopters and 11.1% of the LOW adopters.

Table 9.25: The distribution of HIGH, MEDIUM and LOW adopters according to their speed of adoption

	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
"First year"	100.0	26.1	0.0	33.3	25.0	11.1
"Second year"	0.0	39.1	80.0	66.7	37.5	22.2
"Third and more"	0.0	34.8	20.0	0.0	37.5	66.7

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

In both zones, a positive and significant association was found between the "speed of uptake of an innovation" by farmers and their Adoption Behaviour Scores, r=0.6021 and r=0.5109 for Zone1 and Zone2 respectively.

The importance of this factor was also reported by farmers themselves when they made comments such as "I cannot take risks by myself and adopt chemical fertilizers, high yield varieties and so on. I am waiting for somebody to do it first and see the result of it". "It is not enough for me to see the innovation successful for one time, I have to see it several times and then I have to apply a bit of it in my environment, if it is O.K. I would adopt it, if not I would reject it".

Risk taking can also be inferred from Table 8.12 when farmers reported their advice to Extension workers in order to speed up the adoption of any innovations. The farmers' answers concerning advice to the Extension were not assisted by any statement from the researcher, i.e. they talked by themselves about that advice. In spite of this about half of them reported the same advice. This advice was "Extension worker has to wear Jeans and demonstrate that they are working in a real environment, with reality", while only 12% just advised Extension worker "to supply them with new information about an innovation" as a pre condition for adoption. So a lot of farmers wanted to see the innovation first functioning in their environment and after that they can decide, while only a minority of them wanted to have information about be aware of an innovation and then they would take it up.

Also, farmers' risk taking could be inferred from their reply when they were asked about the adoption of "SHAM 1", a recent released variety of wheat. Only 13% of the farmers used it, 12% said that "if they were aware of it they would have adopted it", another 12% "would like to try a small amount of it first", 28% "would like to wait until their neighbour had tried it for them" and 35% "do not want to use it at all". So it is clear that very few farmers were found to take the initiative to adopt first.

Risk also is partially measured when farmers were talking about their Self-Concept, (this will be discussed in the following section). It is measured through the dimension of "progressiveness", "innovativeness" and "properness". However, as will be seen, the three dimensions were found to relate highly and significantly with the Adoption Behaviour Scores of farmers.

The degree of association between risk taking, which was measured by

different methods, and the Adoption Behaviour Scores of farmers varied from one method to another, but always showed a significant relation each time the correlation was made. The variation from one measurement to the other was caused by the nature of the scale used. This would suggest the importance of this factor as an explanatory and crucial factor for the adoption behaviour of farmers.

Table 9.26: The relation between view of risk and the Adoption Behaviour Scores of farmers

Statement	Zone1 (40)		Zone2 (20)	
	r	p	r	p
1."Innovation is risky"	-0.5817	<0.01	-0.4388	0.05
2."Willingness to be the first to adopt"	0.3922	<0.05	0.3339	NS
3."Speed of adoption"	0.6021	<0.01	0.5109	<0.05

9.3.4 The perception of the characteristics of innovations

This was investigated by asking the farmers' belief in a number of statements.

9.3.4.1 "The current farming practice is easier than the one in the past"

The majority of farmers, 66.7%, believed that "the current farming practices are easier than the one in the past", 16.7% believed that new practices were "more complicated", and the other 16.7% were found in between, Table 9.27.

In Zone1, all the HIGH adopter farmers agreed completely with the statement "the current farming practice is easier than the one in the past", compared to 60.9% and 40% of the MEDIUM and LOW adopters respectively. In Zone2, also, all the HIGH adopters agreed completely with that statement compared to 87.5% and 55.6% of the MEDIUM and LOW adopters respectively, Tables 9.28 and 9.29.

In both zones, a positive relation was found between the perception of the ease of the new technologies and the Adoption Behaviour Scores of farmers,

r=0.4380 and r=0.3938 for Zone1 and Zone2 respectively. This association was significant in Zone1 at $p<0.01$ while in Zone2 it was not. This would suggest that as the perception of innovations as being complex increased the adoption behaviour of farmers decreased, Table 9.30.

However, this finding was based on the general perception of the new technologies by farmers. It was not possible for the researcher to ask farmers in detail about the characteristics of every individual innovation because of the time limit and the ultimate objective of this survey. Therefore, this point should be addressed in any future research.

9.3.4.2 "Innovations are time savers"

Most of farmers, 90%, perceived the new technologies as a "time saver", only 3.3% perceived them as "time consumers" and 6.7% were found in between, Table 9.27.

In Zone1, all the HIGH adopter farmers completely agreed that new technologies or innovations are "time savers" compared to 95.7% and 70% of the MEDIUM and LOW adopters respectively. In Zone2, all the HIGH adopters completely agreed with the statement compared to 87.5% and 66.5% of the MEDIUM and LOW adopters respectively, Tables 9.28 and 9.29.

The perception of innovations as a "time saver" and the Adoption Behaviour Scores of farmers were found to be positively and significantly correlated, r=0.3225 and r=0.4358 for Zone1 and Zone2 respectively. The degree of association in Zone1 was significant at $p<0.05$ while this in Zone2 was significant at p=0.05. There clearly is an association, it may be that adopters having adopted are now able to reflect on the time saved. It may also be that those farmers seeking to save time and make life easier become adopters. Other information for the adoptive farmers suggest their view of themselves as "proper" would suggest that saving time is perhaps not crucial, and so the saving of time is a spin off of the adoption process rather than the reason behind the adoption in the first place.

9.3.4.3 "Innovations are compatible with farm equipment"

The majority of farmers, 71.7%, reported that there was "no compatibility at all" between what they have got on their farm in terms of equipment and

machinery and the innovations, only 13.3% reported "compatibility" and 15% were found in between, Table 9.27.

In Zone1, 42.9% of the HIGH adopters completely agreed that there was "compatibility of innovations with their farm equipment", compared to 17.4% and 0% of the MEDIUM and LOW adopters respectively. In Zone2, only 33.3% of the HIGH adopters completely agreed on the "compatibility of innovations with their farm equipment", compared to none of the MEDIUM and LOW adopters, Tables 9.28 and 9.29.

In both zones, the belief in the compatibility of the innovations with the farm equipment and machinery was found to be correlated positively and significantly with the Adoption Behaviour Scores of farmers, r=0.5617 and r=0.6066 for Zone1 and Zone2 respectively. Both associations were significant at $p<0.01$. This finding would emphasise the necessity for future innovations to be compatible with what farmers have on farm in order to maximize the adoption behaviour of farmers.

Table 9.27: The distribution of farmers by the perception of innovation

Statement	% of farmers in both zones (60)			% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1."Current farming practice is easier than the one in the past"	66.7	16.7	16.7	62.5	20.0	17.5	75.0	10.0	15.0
2."Innovations are time savers"	90.0	6.7	3.3	90.0	7.5	2.5	90.0	5.0	5.0
3."Innovations are compatible with farm equipment"	13.3	15.0	71.7	17.5	22.5	60.0	95.0	0.0	5.0

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree

9.3.5 Self-Concept

Investigating the Self-Concept of farmers was carried out as follows. Each farmer was presented with five dimensional words; "progressive", "efficient", "innovative", "a proper farmer", and "experienced". These words were pre-

Table 9.28: The distribution of the HIGH, MEDIUM and LOW adopters in Zone1 according to their perception of innovations

Statement	% of H adopters			% of M adopters			% of L adopters		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1."Current farming practice is easier than the one in the past"	100.0	0.0	0.0	60.9	30.4	8.7	40.0	10.0	50.0
2."Innovations are time savers"	100.0	0.0	0.0	95.7	4.4	0.0	70.0	20.0	10.0
3."Innovations are compatible with farm equipment"	42.9	42.9	14.3	17.4	21.7	60.9	0.0	10.0	90.0

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree H: HIGH, M: MEDIUM, L: LOW.

Table 9.29: The distribution of the HIGH, MEDIUM and LOW adopters in Zone2 according to their perception of innovations

Statement	% of H adopters			% of M adopters			% of L adopters		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1."Current farming practice is easier than the one in the past"	100.0	0.0	0.0	87.5	0.0	12.5	55.6	22.2	22.2
2."Innovations are time savers"	100.0	0.0	0.0	87..5	12.5	0.0	66.7	22.2	11.1
3."Innovations are compatible with farm equipment"	33.3	0.0	66.7	0.0	0.0	100.0	0.0	0.0	100.0

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree H: HIGH, M: MEDIUM, L: LOW.

Table 9.30: The relation between perception of innovations and the Adoption Behaviour Scores of farmers

Statement	Zone1 (40)		Zone2 (20)	
	r	p	r	p
1."Current farming practice is easier than the one in the past"	0.4380	<0.01	0.3938	NS
2."Innovations are time savers"	0.3235	<0.05	0.4358	0.05
3."Innovations are compatible with farm equipment"	0.5617	<0.01	0.6066	<0.01

sented one by one with their definitions to farmers; i.e. they were not presented as words but as several statements describing behaviours etc. When a farmer had identified his Cognized Self, Other Self and Ideal Self on each dimension then he was asked to move to another dimension. For example, "progressive" was presented to farmers by this definition: "a progressive farmer is a notable person in the way he handles farming, probably rich with some extra land, always in front of the others in taking on new ideas". Considering the definition of "progressive" a farmer was asked to give himself a mark on a scale of five points for measuring his Cognized Self first, Other Self second, and thirdly Ideal Self. Then the farmer was asked to move to another dimension to mark the three components and so on until the five dimensions were completed.

Each component of the Self-Concept, "Cognized self", "Other self" and "Ideal self", in relation to the adoption behaviour of farmers will be discussed in detail in this section. Each component of the Self-Concept for each farmer was represented by the same words or statements; "progressive", "efficient", "innovative", "a proper farmer", and "experienced". The dimensions of the Self-Concept was then related to the Adoption Behaviour Scores. The results are represented in Tables 9.31, 9.32 and 9.33.

The identification of the Self-Concept on the first and second segments

of the scale of the Self-Concept can be considered as a negative attitude towards this word describing the self, the identification of the self on the fourth and fifth segment is considered as a positive attitude towards this word describing the self, while the identification of self on the third segment is considered to be as neutral attitude towards this word describing the self, Fig. 9.1.

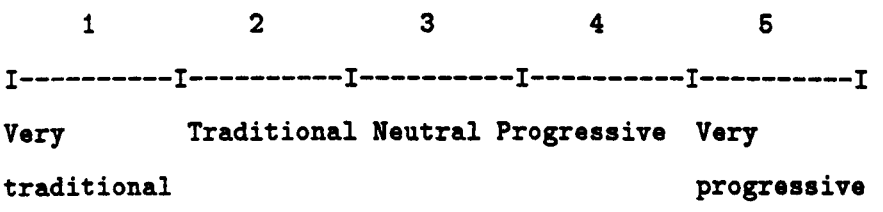


Fig. 9.1 A dimension of the Self-Concept in relation to the word ''Progressive"

9.3.5.1 Progressive (Cognized Self)

The parameters of the dimension are shown by the following statements made by farmers in the study. "I am happy with my traditional varieties of wheat, I do not want to change them, talk to other people about the new varieties, they would take them first". "I am forced to cultivate by tractor or to sow by machine, they are like the devil, like every machine, since their introduction to this society the good things have gone". "I am a well known person, I am the first one in this village who brought the new thing. I brought the thresher machine, combine harvester, made a well, used high yield varieties, herbicides, pesticides etc.". "I am an old fashioned farmer, not obsessed with change like ABO FOLAN". "The new thing imposed itself on me and I did not like it". "I am a progressive farmer but lack the capital to make me appear progressive". "I am the first one who brought a television set in this village".

The percentage of farmers who identified themselves on the first and second segment of the scale, i.e. "very traditional" or "traditional" was found to be 28%, 27% identified themselves on the fourth segment but none identified themselves on the fifth segment of the scale, and 45% were found in the third segment, i.e neither traditional nor progressive, Fig. 9.2 and Appendix E.

In Zone1, most of the HIGH adopter farmers, 86%, perceived themselves as "progressive", compared to 26% and 10% of the MEDIUM and LOW adopters respectively. The percentage of MEDIUM adopters who perceived themselves as "traditional" or very "traditional" farmers were found to be 30% compared to 40% of the LOW adopters, Fig. 9.3 and Appendix E. In Zone2, 67% of the HIGH adopters identified themselves as "progressive" compared to none of the MEDIUM adopters and 11% of the LOW adopters, Fig. 9.4 and Appendix E.

In both zones a positive and significant relation was found between the perception of being "progressive" by farmers and their Adoption Behaviour Scores, r=0.5699 and r=0.5352 for Zone1 and Zone2 respectively. Both associations were significant at $p<0.01$ and $p<0.05$ for Zone1 and Zone2 respectively. This suggests that the perception of "progressiveness" did increase as the adoption of farm innovations increased, Table 9.31.

9.3.5.2 Progressive (Other Self)

The parameters of the dimension are shown by the following statements made by farmers during the interview. "I do not really need the type of equipment you have seen in order to serve my land properly, they are too huge for my land, but I cannot buy smaller than these because other farmers like myself will laugh at me". "I am very proud of applying SHAM 1 as the first person in my village, everybody gets talking about me". "Every farmer knew that I was the first one in my country to import MAXIBACK and plant it, I am very proud of this". "I would not apply chemical fertilizers not because I am not convenced of its importance, but because no one in my group applied them. We all are waiting for some one who is progressive in order to take this initiative, and I am doubtful if any of us could do it".

The percentage of farmers who identified themselves, as others perceived them, on the fourth and fifth segment of the scale, i.e. "progressive" or "very progressive", was found to be 31%, 30% identified themselves as others perceived them on the first and second segment of the scale, i.e. "traditional" or "very traditional", and 40% were found in between, Fig. 9.2 and Appendix E.

In Zone1, most of the HIGH adopters, 86%, perceived themselves, as

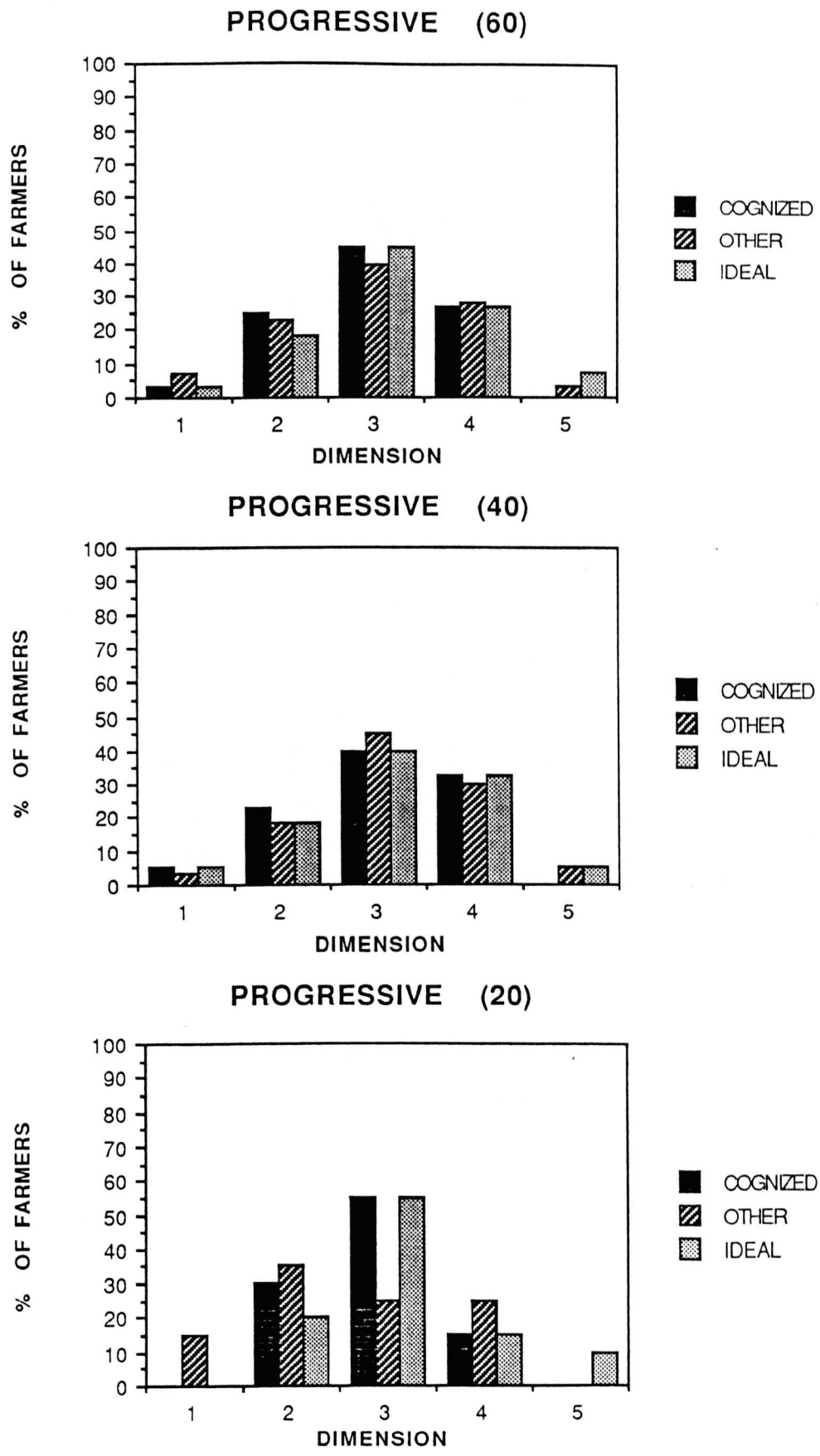


Fig. 9.2 The distribution of Farmers in Zone1 & Zone2 (60); Zone1 (40), and Zone2 (20)

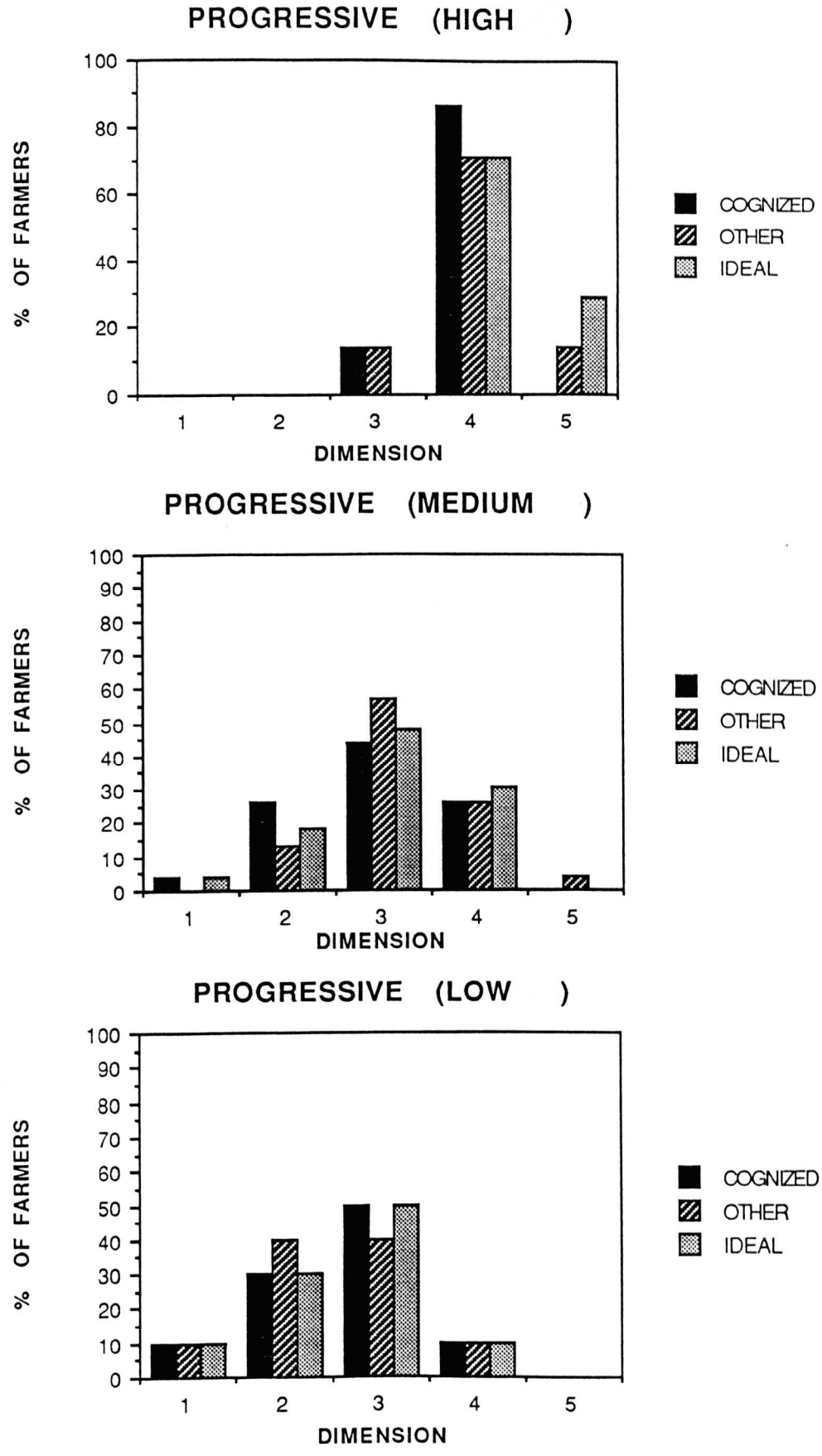


Fig.9.3 The distribution of HIGH, MEDIUM and LOW Adopters in Zone1

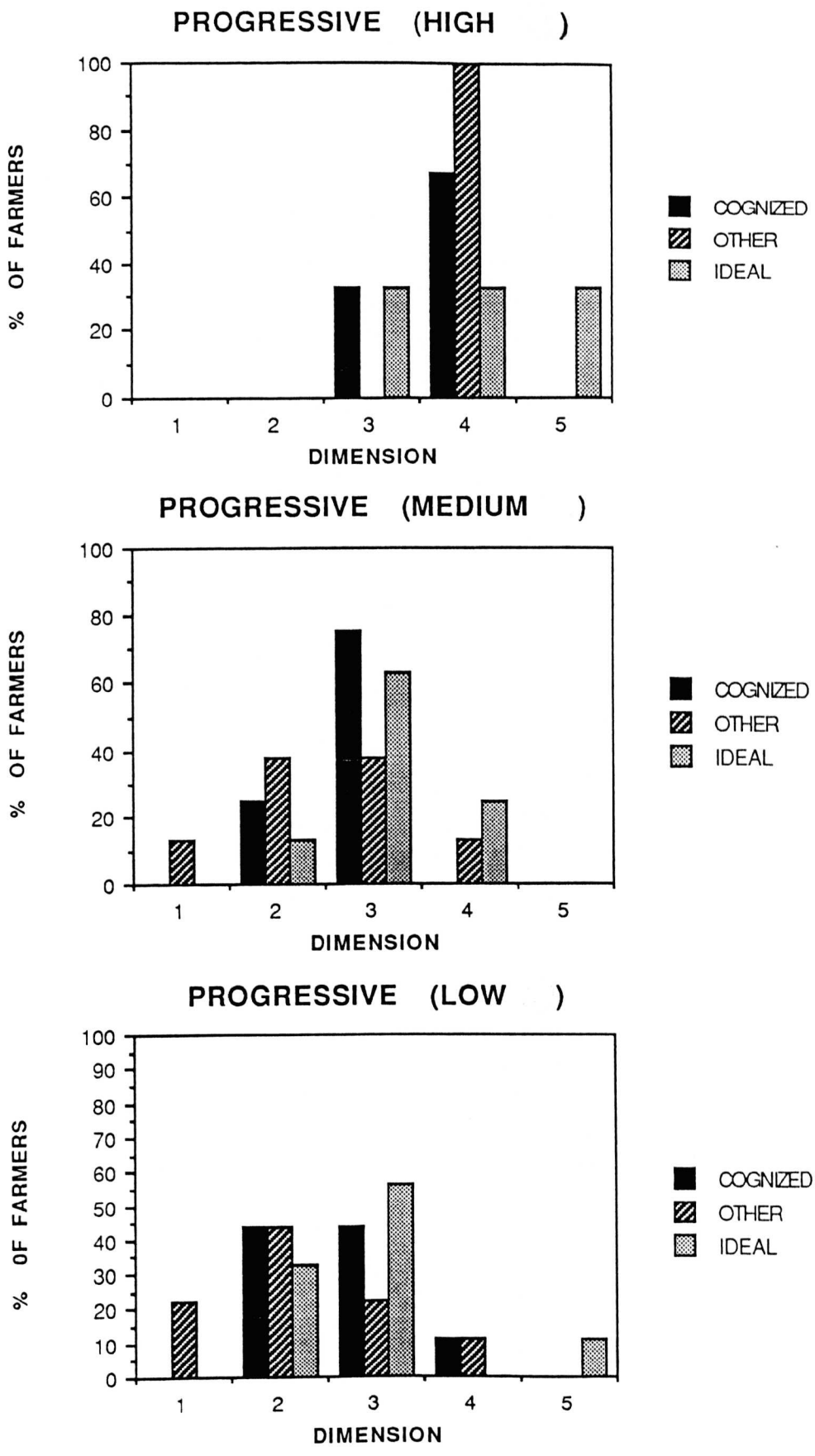


Fig.9.4 The distribution of HIGH, MEDIUM and LOW adopters in Zone2

others saw them, as "progressive" or "very progressive", compared to 30% of the MEDIUM adopters and only 10% of the LOW adopters, Fig. 9.3 and Appendix E. In Zone2, all the HIGH adopters perceived themselves as others saw them, as "progressive" compared to 13% and 11% of the MEDIUM and LOW adopters respectively, Fig. 9.4 and Appendix E.

In both zones, a positive and highly significant association was found between the perception of being progressive, as they think others perceive them, and the Adoption Behaviour Scores of farmers, r=0.5999 and r=0.6946 for Zone1 and Zone2 respectively. Both associations were found to be significant at $p<0.01$. This would suggest that farmers could isolate a perception of themselves as other saw them. Being seen in a progressive way clearly is important to many of the HIGH adopter farmers and may have influenced their adoption behaviour, Table 9.32.

9.3.5.3 Progressive (Ideal Self)

The parameters of the dimension are shown by the following statements made by farmers in the study. "I would like to stay where I am". "I would like to be at the top of every farmer and everybody look at me. I never look behind myself. I am always looking forward". "My progress in farming is all right but this would not satisfy me, I am looking for the best". "I would like to be seen as an average farmer".

The percentage of farmers who identified themselves on the fourth and fifth segment of the scale, i.e. those who would like to be seen as "progressive" or "very progressive" farmers, was found to be 34%, 21% identified themselves on the first and second segment, i.e those who would like to be seen as "traditional" or "very traditional" farmers, and 45% were found in between, Fig. 9.2 and Appendix E.

In Zone1, all the HIGH adopter farmers would like to be seen as "progressive" or "very progressive" farmers, compared to 31% and 10% of the MEDIUM and LOW adopters respectively, Fig. 9.3 and Appendix E. In Zone2, 67% of the HIGH adopters would like to be seen as "progressive" or "very progressive" farmers compared to 25% and 11% of the MEDIUM and LOW adopters respectively. This would suggest that wanting to be seen as "progressive" was an important motivation for the HIGH adopter farmers,

Fig. 9.4 and Appendix E.

In both zones, a positive and significant association was found between the perception of liking to be seen as "progressive" farmers and the Adoption Behaviour Scores of farmers, r=0.6934 and r=0.4745 for Zone1 and Zone2 respectively. Both associations were found to be significant at $p<0.01$ and $p<0.05$ respectively. This would suggest that the perception of wanting to be seen as "progressive" influenced the adoption of farm innovations, Table 9.33.

9.3.5.4 Innovative (Cognized Self)

The parameters of the dimension are shown by the following statements made by farmers in response to the questioning. "I never give up thinking about farming in order to make it more efficient". "I have resolved many problems by creating different solutions. Although the price was very high I am proud of what I have done". "I work paying no real attention to farming".

The percentage of farmers who identified themselves on the fourth and fifth segment of the scale, i.e. "innovative" or "very innovative", was found to be 30%, 38% identified themselves on the first and second segment of the scale, i.e "not innovative", and 32% identified themselves in between, Fig. 9.5 and Appendix E.

In Zone1, all the HIGH adopter farmers perceived themselves as "innovative" or "very innovative" farmers, compared to 35% and 0% of the MEDIUM and LOW adopters respectively. The percentage of the MEDIUM adopters who perceived themselves as "not innovative" farmers were found to be 26% compared to 80% of the LOW adopters, Fig. 9.6 and Appendix E. In Zone2, 33% of the HIGH adopters identified themselves as "innovative" farmers compared to 13% and 11% of the MEDIUM and LOW adopters respectively. The low percentage of HIGH adopters who see themselves as "innovative" farmers in Zone2 compared with Zone1 might be affected by the harsh weather under which farmers are living and hence the lower relative level of adoption, Fig. 9.7 and Appendix E.

In both zones, a positive and significant relationships was found between the perception of innovativeness and the Adoption Behaviour Scores

of farmers, r=0.7269 and r=0.5285 for Zone1 and Zone2 respectively. Both associations were significant at $p<0.01$ and $p<0.05$ for Zone1 and Zone2 respectively. This would suggest that as might be expected the perception of the innovativeness of farmers increased as the adoption behaviour of the farm innovations increased. This pattern might confirm that farmers were in fact effectively judging themselves and recognized their image as being associated with their behaviour.

9.3.5.5 Innovative (Other Self)

The parameters of the dimension are shown by the following statements made by farmers during the interview. "Everybody has talked about me and are thankful to me when I resolved some of the technical problems which were associated with wheat production, I look forward to tackling more."

Only a quarter of the farmers identified themselves, as perceived by others, on the fourth and fifth segment of the scale, i.e. as "innovative" or "very innovative" farmers, 43% identified themselves on the first and second segment of the scale,i.e. "not innovative", and 32% were found in between, Fig. 9.5 and Appendix E.

In Zone1, all the HIGH adopters perceived themselves, as other saw them, as "innovative" or "very innovative" farmers, compared to only 22% of the MEDIUM adopters and none of the LOW adopters. The percentage of MEDIUM adopters who perceived themselves as "not innovative" was found to be 48% compared to 70% of the LOW adopters who perceived that, Fig. 9.6 and Appendix E. In Zone2, 33% of the HIGH adopters perceived themselves, as others saw them, as "innovative" compared to 0% and 22% of the MEDIUM and LOW adopters respectively. The lower figures for the HIGH adopters in Zone2 may reflect that the HIGH adopters there were making relatively little use of many innovations, Fig. 9.7 and Appendix E.

In both zones, a positive association was found between the Other Self, concerning innovativeness, and the Adoption Behaviour Scores of farmers, r=0.6828 and r=0.3420 for Zone1 and Zone2 respectively. The degree of association in Zone1 was significant at $p<0.01$ while this in Zone2 was not significant even at $p=0.05$.

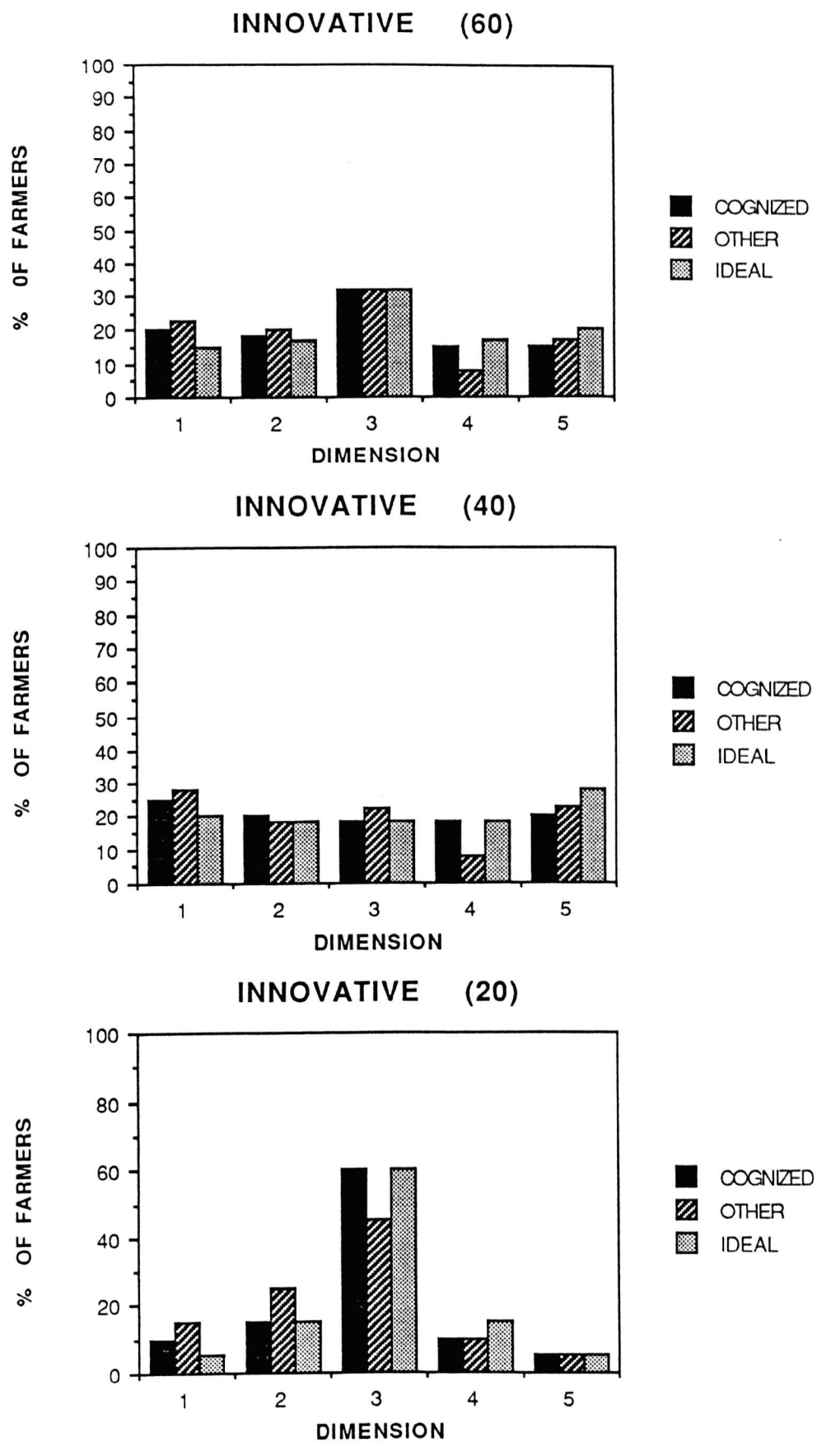


Fig.9.5 The distribution of farmers in Zone1&Zone2 (60); Zone1 (40) and Zone2 (20)

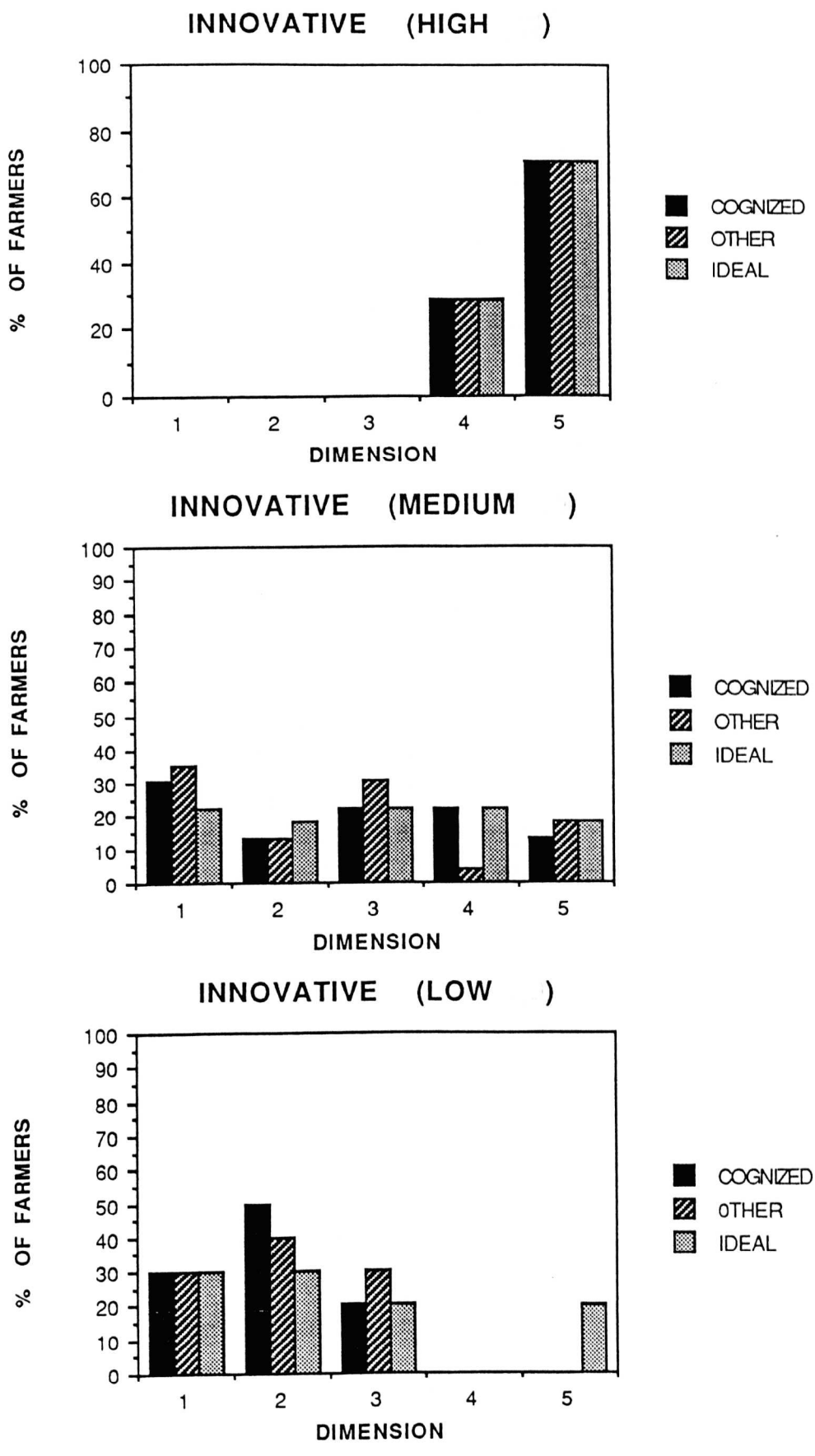


Fig.9.6 The distribution of HIGH, MEDIUM and LOW adopters in Zone1

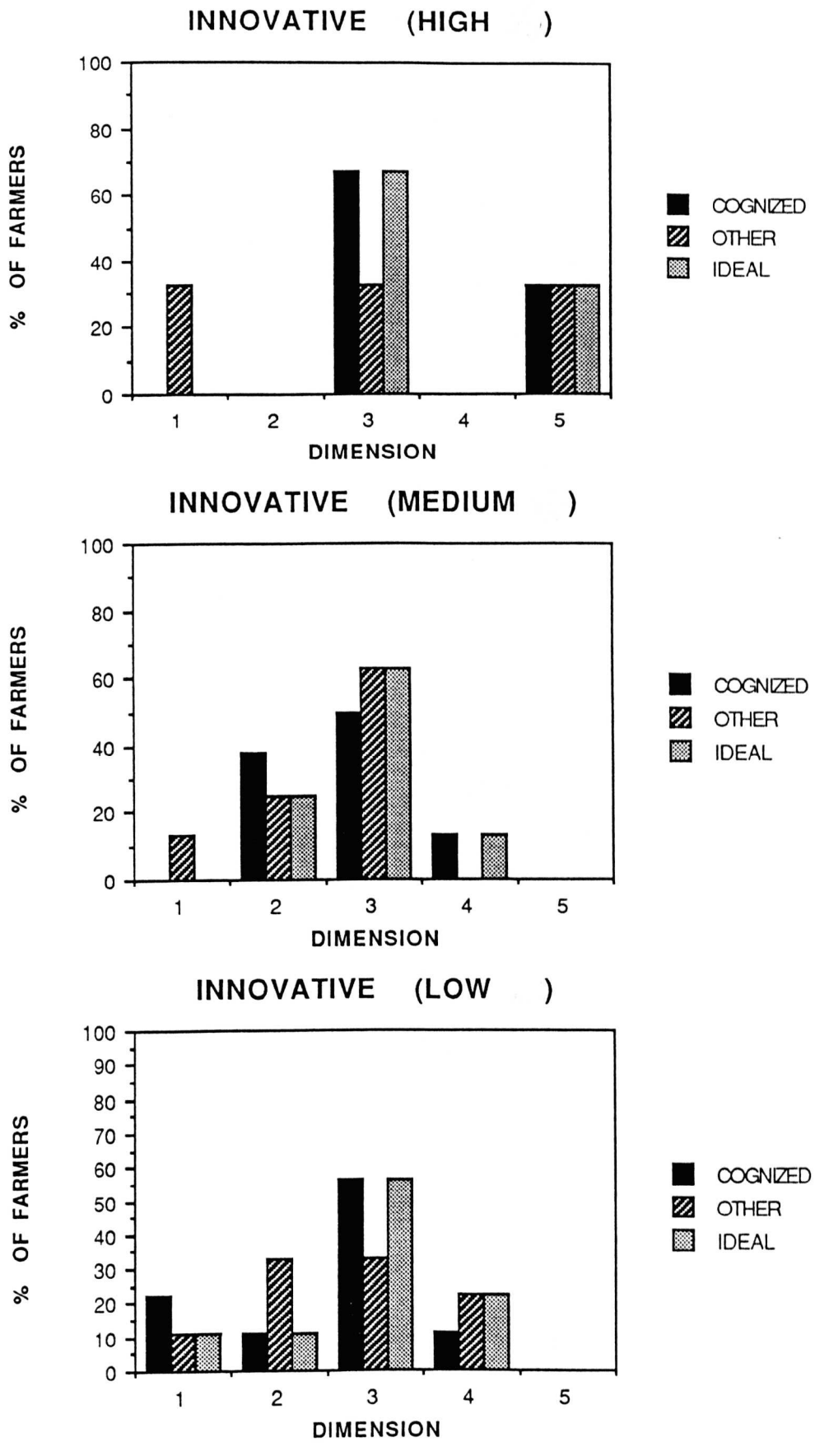


Fig.9.7 The distribution of HIGH, MEDIUM and LOW adopters in Zone2

9.3.5.6 Innovative (Ideal Self)

Over a third of the farmers, 37%, identified themselves on the fourth or fifth segment of the scale, i.e. those who would like to be seen as "innovative" or "very innovative" farmers, 32% identified themselves on the first and second segment, i.e. those who would like to be seen as "not innovative", and 32% were found in between, Fig. 9.5 and Appendix E.

In Zone1, all the HIGH adopters would like to be seen as "innovative" or "very innovative" farmers, compared to 20% and another 20% of the MEDIUM and LOW adopters. Again suggesting that the adoptive farmers wanted to be seen as "progressive" and "innovative". Their motivation was influenced by their desire to be looked up to. Over a third of the MEDIUM adopters, 40%, would like to be seen as "not innovative" while 60% of the LOW adopters would like that, Fig. 9.6 and Appendix E. In Zone2, 33% of the HIGH adopters would like to be seen as "innovative" or "very innovative" compared to 38% and 22% of the MEDIUM and LOW adopters respectively, Fig. 9.7 and Appendix E.

In both zones, a positive and significant association was found between the perception of liking to be seen as innovative farmers and the Adoption Behaviour Scores of farmers, r=0.5661 and r=0.4830 for Zone1 and Zone2 respectively. This would suggest that as the perception of liking to be seen as the innovative farmer increased then the adoption of the farm practices or innovations increased. The farmers innovate as they like to be seen as innovative.

9.3.5.7 Efficient (Cognized Self)

The parameters of the dimension are shown by the following statements made by farmers during the survey. "Oh my son, I am a type of person who believes in passivity of working and living not like other people who measure even tiny things". "I do not think that there are many farmers like me, I am obsessed with records, I keep records for everything related to agriculture, I record even the rainy days throughout years, the number of the rainy hours a day, and the type of cloud and rainfall was also recorded, ask every farmer in this region, they will tell you who I am in relation to this matter".

The percentage of farmers who identified themselves on the first and

second segment of the scale i.e. "inefficient", were found to be 22%, 28% identified themselves on the fourth and fifth segment of the scale, i.e. "efficient" or "very efficient" and 60% were found to be in between, Fig. 9.8 and Appendix E.

In Zone1, only 14% of the HIGH adopters perceived themselves as "efficient" or "very efficient", compared to 31% of the MEDIUM adopters and none of the LOW adopters. None of the HIGH adopters perceived themselves as "inefficient" or "very inefficient", while 13% of the MEDIUM adopters and 40% of the LOW adopters perceived themselves like that, i.e. "inefficient", Fig. 9.9 and Appendix E. In Zone2,only 33% of the HIGH adopters identified themselves on the fourth segment of the scale compared to 13% and 11% of the MEDIUM and LOW adopters respectively, Fig. 9.10 and Appendix E.

In both zones, a positive relation was found between the perception of being efficient by farmers and their Adoption Behaviour Scores, r=0.3735 and r=0.1933 for Zone1 and Zone2 respectively. This association in Zone1 was significant at $p<0.05$ while in Zone2 this was not significant. It is perhaps surprising that more of the HIGH adopters did not consider themselves "efficient", it is possible that the more farmers adopted the more they realise how far they were off the full potential for their farms.

9.3.5.8 Efficient (Other Self)

The percentage of farmers who identified themselves, as perceived by others, on the fourth and fifth segment of the scale, i.e. "efficient" or "very efficient" was found to be 37%, 34% identified themselves on the first and second segment of the scale, i.e. "inefficient" or "very inefficient", and 20% were found in between, Fig. 9.8 and Appendix E.

In Zone1, most of the HIGH adopter farmers, 86%, perceived themselves as seen by others, as "efficient" or "very efficient", compared to 49% and 10% of the MEDIUM and LOW adopters respectively. Only 14% of the HIGH adopters perceived themselves as "inefficient" or "very inefficient" while 17% of the MEDIUM adopters and 70% of the LOW adopters perceived that, Fig. 9.9 and Appendix E. In Zone2, 33% of the HIGH adopters identified themselves on the fourth and fifth segment of the scale compared to 25%

and 22% of the MEDIUM and LOW adopters respectively, Fig. 9.10 and Appendix E.

In both zones, a positive relation existed between the perception of being efficient, this as seen by others, and the Adoption Behaviour Scores of farmers, r=0.4993 and r=0.2053 for Zone1 and Zone2 respectively. The degree of association was found to be significant at $p<0.01$ in Zone1 but it was not significant in Zone2. The self image of efficiency is thus related to adoption but not particularly strongly.

9.3.5.9 Efficient (Ideal Self)

More than half of the farmers, 59%, identified themselves on the fourth and fifth segment of the scale, i.e. those who would like to be seen as "efficient" or "very efficient", only 11% identified themselves on the first and second segment of the scale, i.e. those who would like to be seen as "inefficient" or "not efficient at all", and 30% were found in between, Fig. 9.8 and Appendix E.

In Zone1, all the HIGH adopters would like to be seen as "efficient" or "very efficient" farmers, compared to 83% of the MEDIUM adopters and only 20% of the LOW adopters. The percentage of MEDIUM adopters who would like to be seen as "inefficient" or "not efficient at all" was found to be only 4%, compared to 30% of the LOW adopters who liked that, Fig. 9.9 and Appendix E. In Zone2, the majority of the HIGH adopters, 67%, identified themselves on the fourth and fifth segment of the scale compared to 38% and 22% of the MEDIUM and LOW adopters respectively. It is clear that HIGH adopters really do want to be seen as efficient even if they recognize that they are not currently always highly efficient, Fig. 9.10 and Appendix E.

In both zones, a positive and significant relation was found between the perception of liking to be seen as efficient and the Adoption Behaviour Scores of farmers, r=0.5229 and r=0.4386 for Zone1 and Zone2 respectively. Both associations were significant at $p<0.01$ and $p=0.05$ respectively. This suggests that as the perception of liking to be seen as efficient farmers increased the adoption of the related farm innovations is likely to increase.

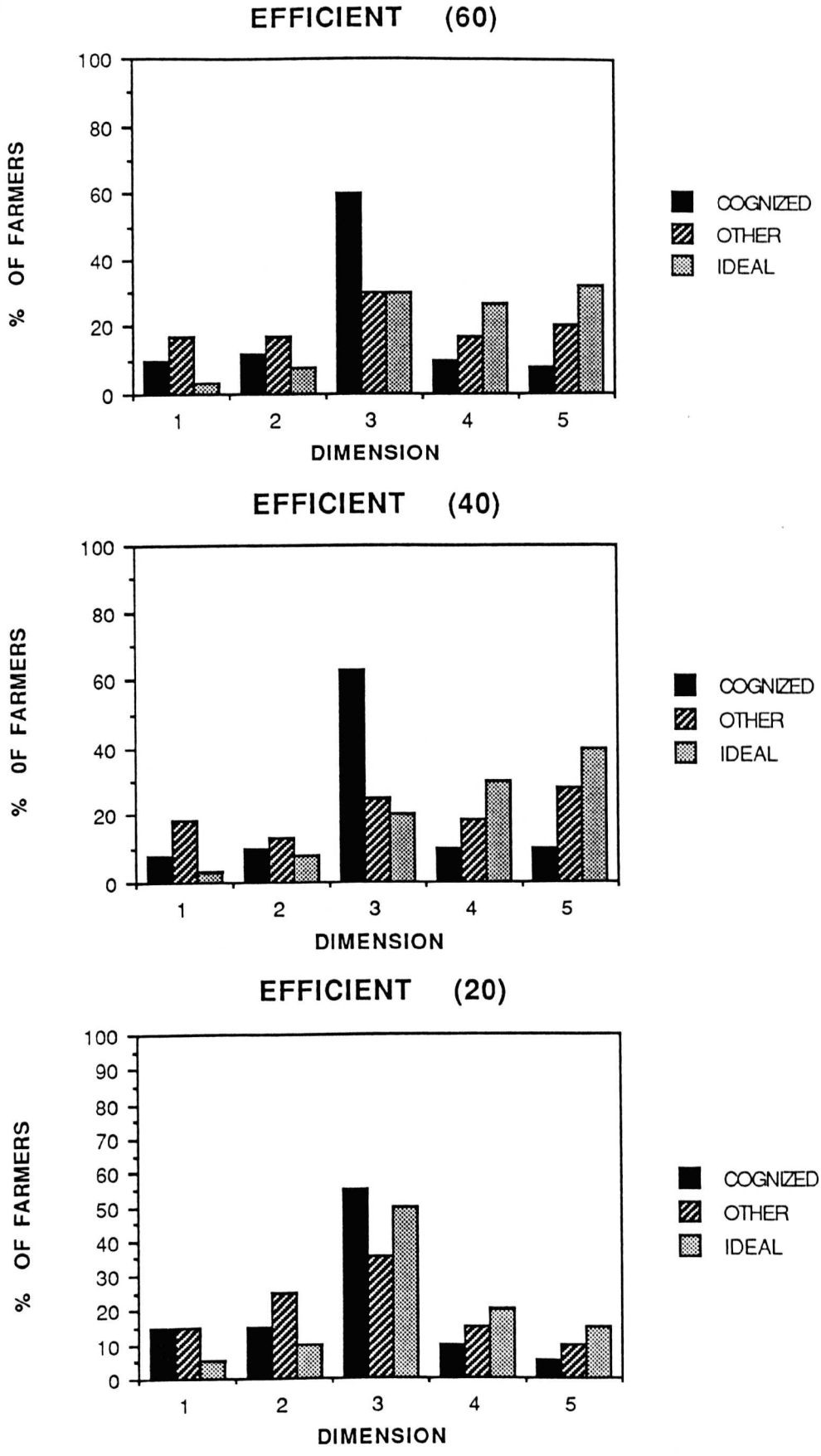


Fig.9.8 The distribution of farmers in Zone1&Zone2 (60); Zone1 (40) and Zone2 (20)

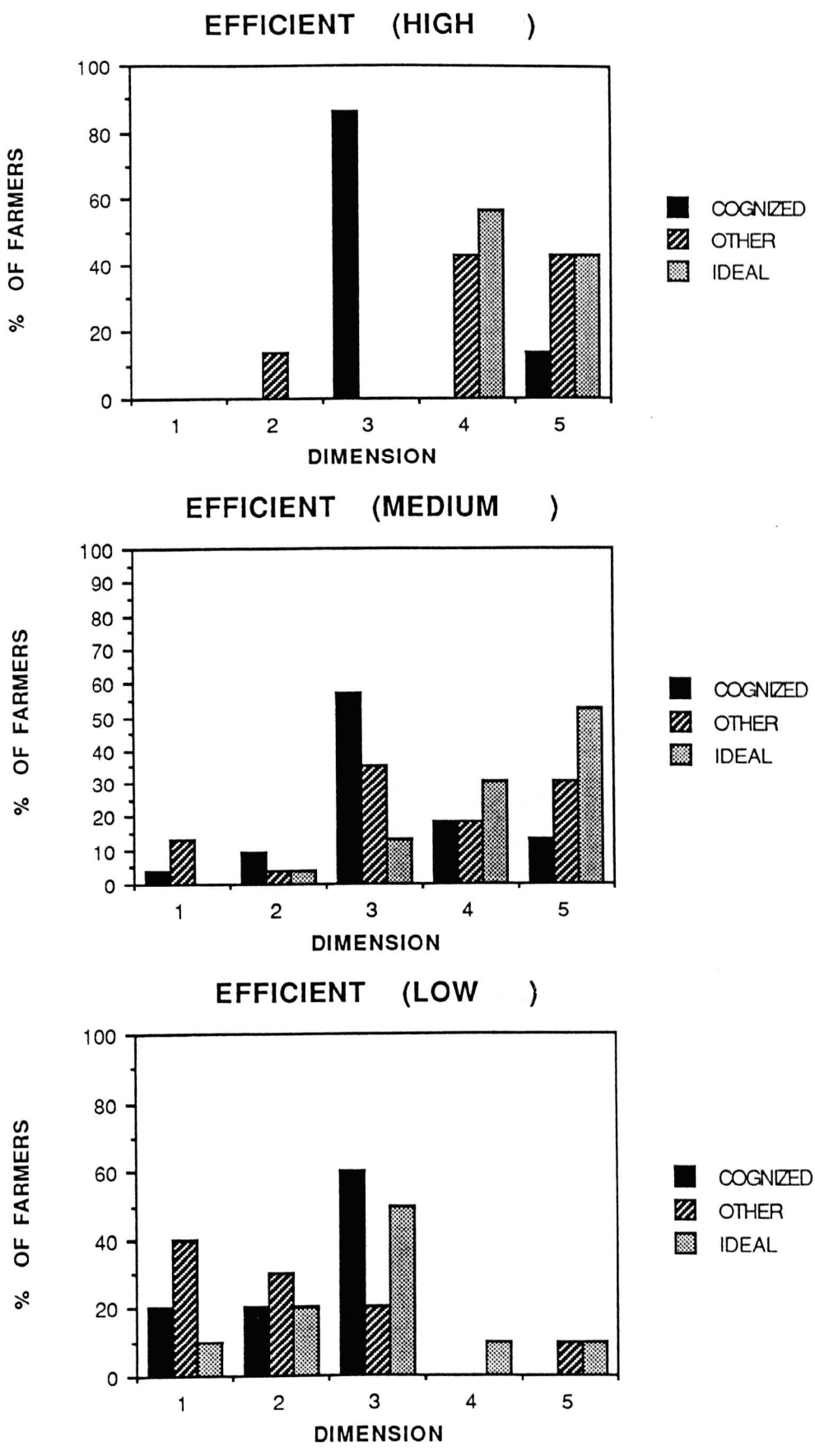


Fig.9.9 The distribution of HIGH, MEDIUM and LOW adopters in Zone1

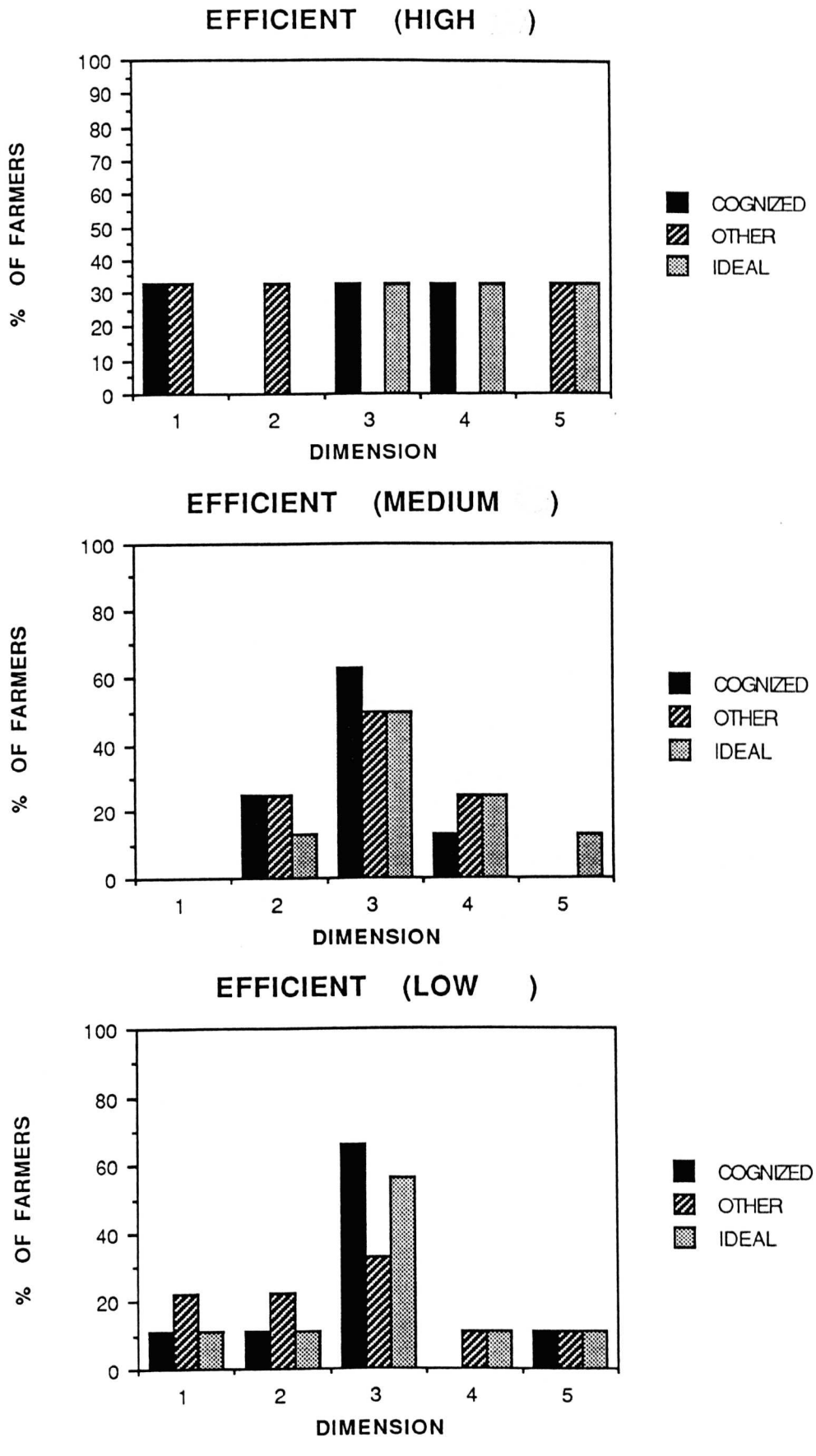


Fig.9.10 The distribution of HIGH, MEDIUM and LOW adopters in Zone2

9.3.5.10 Experienced (Cognized Self)

The parameters of the dimension are shown by the following statements made by farmers in the study. "All farmers are learning from me. I never leave any opportunity for gaining knowledge about farming, I used to go to many farming activities without any invitation. I listened carefully and wrote down every bit of information". "I have no experience at all..... I am merely a shepherd".

Only 15% of the farmers identified themselves on the fourth and fifth segment of the scale, i.e. "experienced" or "very experienced" farmers, 30% identified themselves on the first and second segment of the scale, i.e. not "experienced" and over half, 55%, identified themselves in between, Fig. 9.11 and Appendix E.

In Zone1, over half of the HIGH adopters, 57%, perceived themselves as "experienced" or "very experienced" farmers, compared to 9% and 10% of the MEDIUM and LOW adopters respectively. None of the HIGH adopter farmers perceived themselves as "not an experienced" farmer, while 13% of the MEDIUM adopters and the majority of the LOW adopters, 80%, perceived that, Fig. 9.12 and Appendix E. In Zone2, 33% of the HIGH adopters identified themselves on the fourth and fifth segment of the scale compared to none of the MEDIUM adopters and 11% of the LOW adopters, Fig. 9.13 and Appendix E.

In both zones, a positive and significant association was found between the perception of being experienced and the Adoption Behaviour Scores of farmers, r=0.6208 and r=0.4394 for Zone1 and Zone2 respectively. Both associations were significant at $p<0.01$ and $p=0.05$ respectively. This would suggest that the adoption of farm innovations and the farmers view of his level experience are related.

9.3.5.11 Experienced (Other Self)

The percentage of farmers who identified themselves, as perceived by others, on the fourth and fifth segment of the scale, i.e. "experienced" or "very experienced", was found to be 32%, only 19% identified themselves on the first and second segment of the scale, i.e "not experienced" or "not experienced at all", and 48% were found in between, Fig. 9.11 and Appendix E.

In Zone1, about three quarters of the HIGH adopters, 71%, perceived themselves as seen by others, as "experienced" or "very experienced" farmers, compared to 35% and 10% of the MEDIUM and LOW adopters respectively. The percentage of the MEDIUM adopters who perceived themselves as "not experienced" or "not experienced at all" was found to be 13% compared to 30% of the LOW adopters who perceived that, Fig. 9.12 and Appendix E. In Zone2, the majority of the HIGH adopters, 67%, identified themselves as seen by others on the fourth and fifth segment of the scale, i.e. "experienced" compared to 38% and 11% of the MEDIUM and LOW adopters respectively, or "very experienced" Fig. 9.13 and Appendix E.

In both zones, a positive and significant relation was found between the Other Self, concerning experience, and the Adoption Behaviour Scores of farmers r=0.4061 and r=0.6217 for Zone1 and Zone2 respectively. Both associations were found to be significant at $p<0.01$. This suggests that the perception of being seen as "experienced" farmers by others and the adoption behaviour of farmers are related.

9.3.5.12 Experienced (Ideal Self)

The percentage of farmers who identified themselves on the fourth and fifth segment of the scale, i.e. those who would like to be seen as "experienced" or "very experienced", was found to be 42%, only 12% identified themselves on the first and second segment of the scale, i.e. those who would like to be seen as "not experienced" and "not experienced at all", and about half, 47%, were found in between, Fig. 9.11 and Appendix E. It is clear that while being seen as "progressive" or "innovative" is to some extent in the farmers control there is not a great deal a farmer can do about experience to change his image.

In Zone1, all the HIGH adopters would like to be seen as "experienced" or "very experienced farmers", compared to 39% and only 20% of the MEDIUM and LOW adopters respectively, Fig. 9.12 and Appendix E. In Zone2, 67% of the HIGH adopters identified themselves on the fourth segment of the scale compared to the half of the MEDIUM adopters and 11% of the LOW adopters, Fig. 9.13 and Appendix E.

In both zones, a positive and significant association was found between

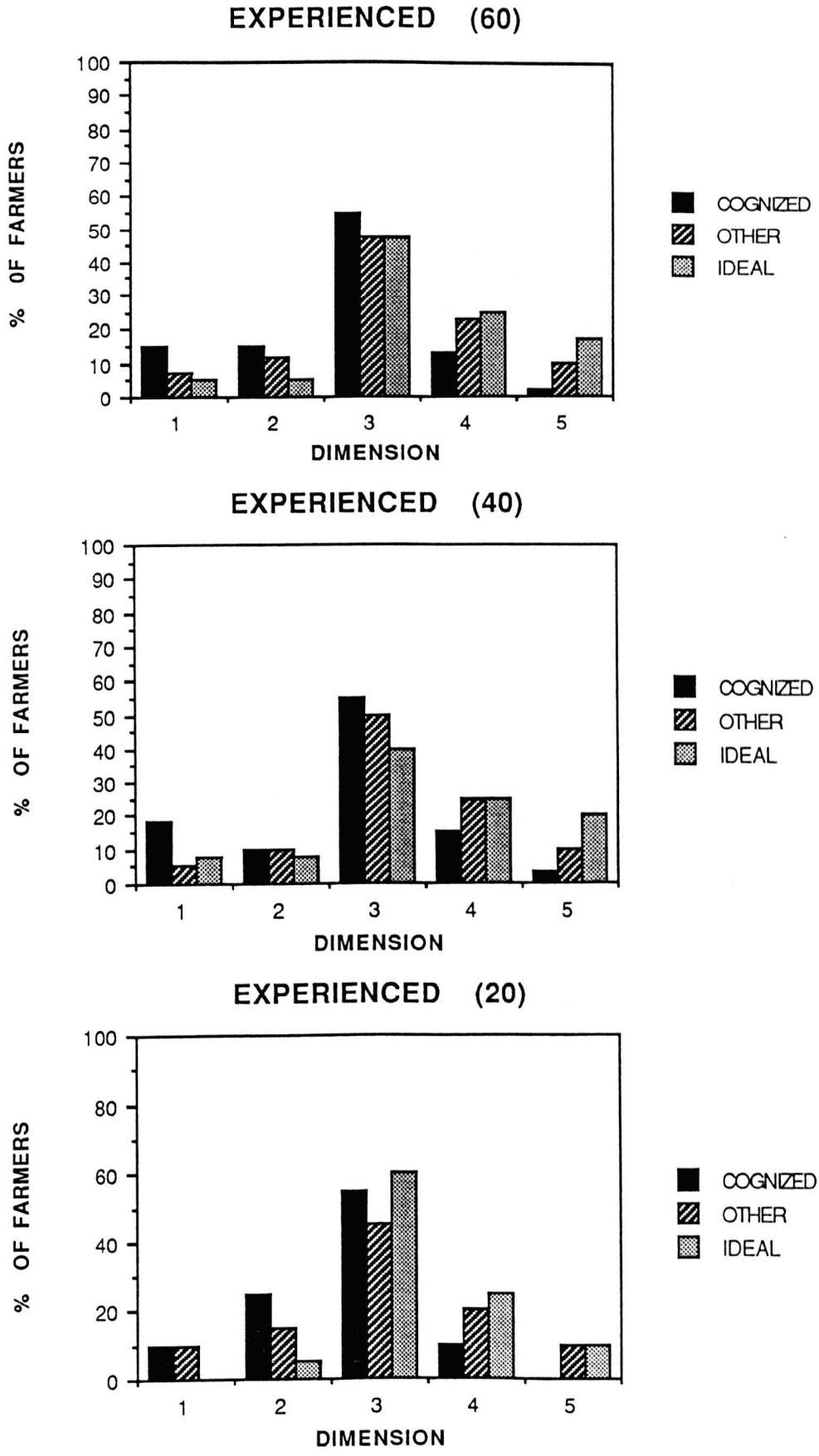


Fig.9.11 The distribution of farmers in Zone1&Zone2 (60); Zone1 (40) and Zone2 (20)

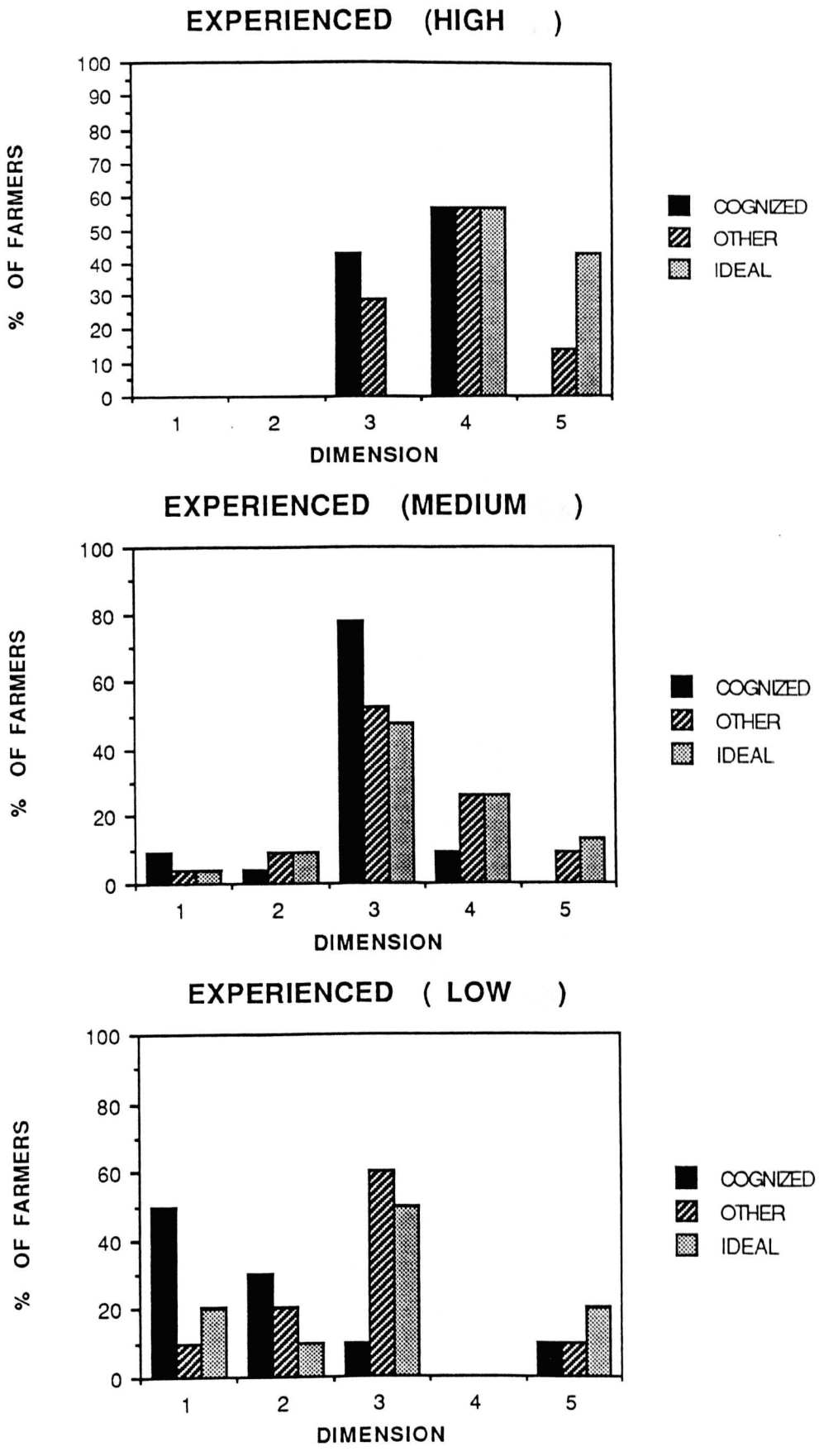


Fig.9.12 The distribution of HIGH, MEDIUM and LOW adopters in Zone1

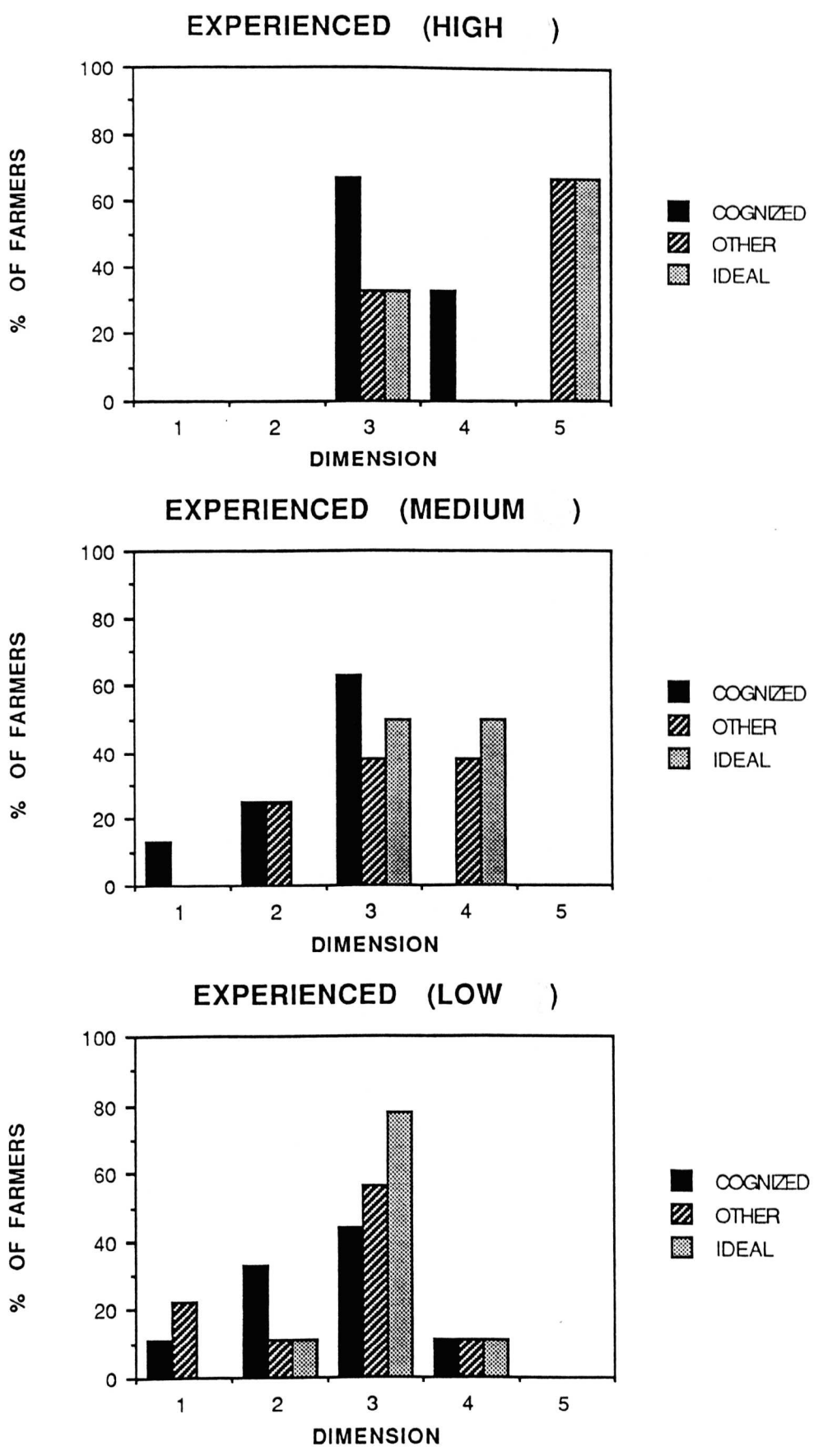


Fig.9.13 The distribution of HIGH, MEDIUM and LOW adopters in Zone2

the perception of liking to be seen as experienced farmers and the Adoption Behaviour Scores of farmers, r=0.5656 and r=0.6789 for Zone1 and Zone2 respectively. Both associations were significant at $p<0.01$. This means that the perception of liking to be seen as experienced and the adoption of the farm innovations are related.

9.3.5.13 A proper farmer (Cognized Self)

The parameters of the dimension are shown by the following statements as made by farmers. "I am not a farmer, you should not call me a farmer, if you do that you are insulting a real farmer like ABO FOLAN". "I am laughing at farming and farming is laughing at me. Farming deserves for people who can serve it properly, I am not the one who can do it".

The percentage of farmers who identified themselves on the fourth segment of the scale, i.e. "proper farmer" was found to be 22%, none have identified themselves on the fifth segment, 30% identified themselves on the first and second segment, i.e. "not proper", and 48% were found in between, Fig. 9.14 and Appendix E.

In Zone1 the majority of the HIGH adopter farmers, 86%, perceived themselves as "proper farmers", compared to 22% and 10% of the MEDIUM and LOW adopters respectively. The percentage of the MEDIUM adopters who perceived themselves as "not proper farmers" was found, as might be expected, to be low i.e. 22%, compared to 60% of the LOW adopters, Figs. 9.15, 9.16 and Appendix E.

In both zones, a positive and significant relation was found between the perception of being a "proper farmer" and adoption behaviour, r=0.5795 and r=0.6066 for Zone1 and Zone2 respectively. Both associations were significant at $p<0.01$. This would suggest that the perception of being a "proper farmer" is strongly related to the adoption of the farm innovations.

9.3.5.14 A proper farmer (Other Self)

The percentage of farmers who identified themselves, as perceived by others, on the fourth and fifth segment of the scale, i.e "proper farmers", was found only to be 18%, 33% identified themselves on the first and second segment of the scale, i.e. "not proper farmers", and 48% were found to be in between,

Fig. 9.14 and Appendix E.

In Zone1, all the HIGH adopter farmers perceived themselves as seen by others, as "proper farmers", compared to 13% and 0% of the MEDIUM and LOW adopters respectively. Just over a quarter, 26%, of the MEDIUM adopters perceived, themselves as "not proper farmers" while over half of the LOW adopters, 60%, perceived that, Fig. 9.15 and Appendix E. In Zone2, only 33% of the HIGH adopters identified themselves on the fourth and fifth segment of the scale compared to none of the MEDIUM and LOW adopters, Fig. 9.16 and Appendix E.

In both zones, a positive and highly significant association was found between the perception by others concerning the "properness" of the farmer and the Adoption Behaviour Scores of farmers, r=0.8043 and r=0.7274 for Zone1 and Zone2 respectively. Both associations were significant at $p<0.01$. This would suggest that the perception of being a "proper farmer" as seen by others, is strongly related to the adoption of farm innovations.

9.3.5.15 A proper farmer (Ideal Self)

Just above a quarter of the farmers, 26%, identified themselves on the fourth and fifth segment of the scale, i.e those who would like to be seen as a "proper farmer", 22% identified themselves on the first and second segment, i.e. those who would not like to be seen as a "proper farmer", and over half of the farmers, 52%, were scored in between, Fig 9.14 and Appendix E.

In Zone1, all the HIGH adopters would like to be seen as "proper farmers", compared to 22% of MEDIUM adopters and 10% of the LOW adopters. Only 18% of the MEDIUM adopters and 50% of the LOW adopters would not like to be seen as "proper farmers", Fig. 9.15 and Appendix E. In Zone2, the majority of HIGH adopters, 67%, identified themselves on the fourth segment of the scale compared to none of the MEDIUM adopters and 11% of the LOW adopters, Fig. 9.16 and Appendix E.

In both zones, a positive and highly significant association was found between the perception of liking to be seen as "proper farmers" and the Adoption Behaviour Scores of farmers, r=0.7453 and r=0.4676 for Zone1 and Zone2 respectively. Both associations were significant at $p<0.01$ and $p<0.05$ respectively. This means that the perception of liking to be seen as

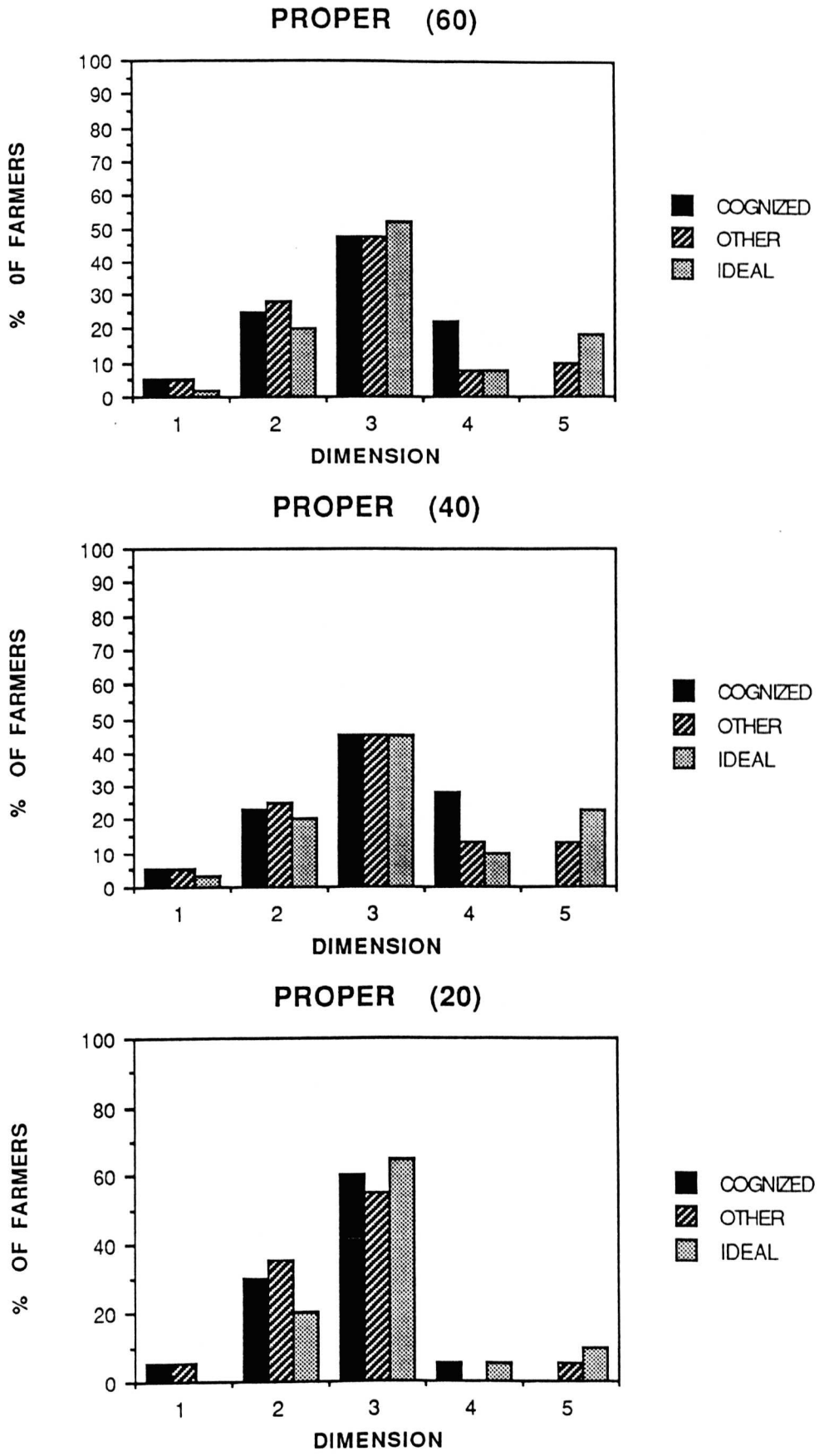


Fig.9.14 The distribution of farmers in Zone1&Zone2 (60); Zone1 (40) and Zone2 (20)

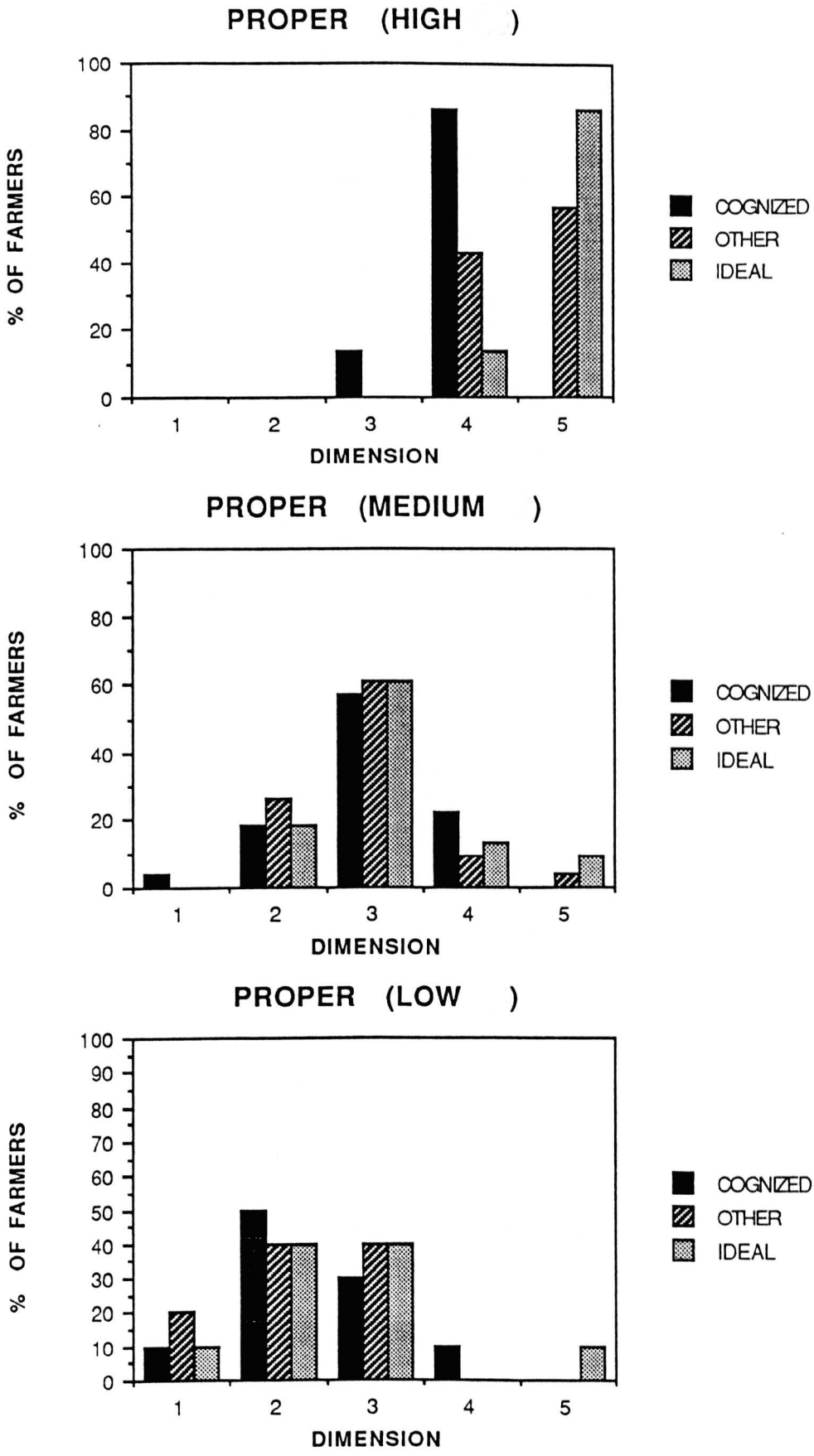


Fig.9.15 The distribution of HIGH, MEDIUM and LOW adopters in Zone1

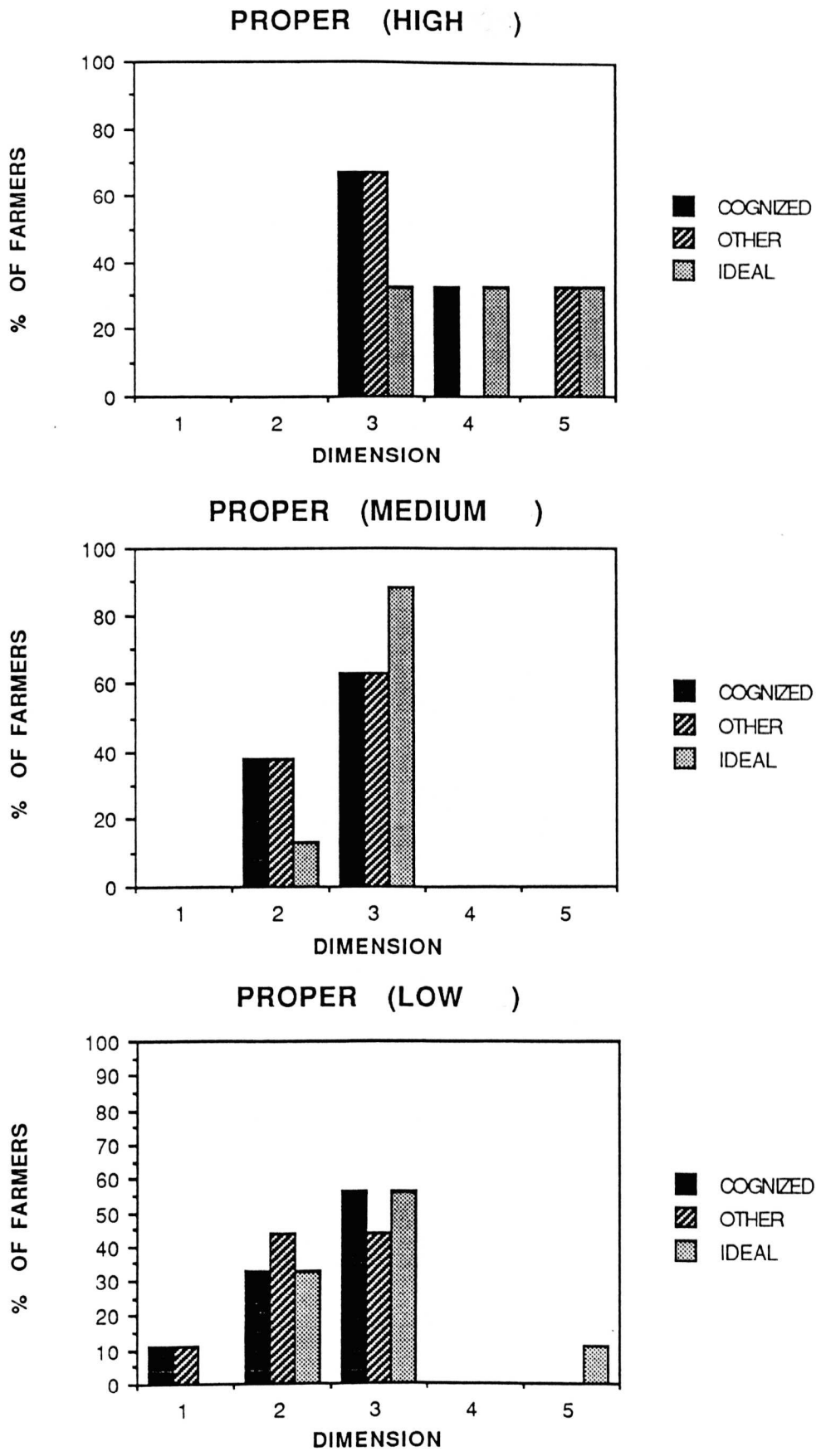


Fig.9.16 The distribution of HIGH, MEDIUM and LOW adopters in Zone2

a "proper farmer" and the adoption of the farm innovation are related.

9.3.5.16 Summary and conclusion on the Self-Concept

In Zone1, all the five dimensions of the Self-Concept were found to be, individually, correlated positively and significantly with the Adoption Behaviour Scores of farmers at $p<0.01$ except the "efficient" dimension which was significant at $p<0.05$. In Zone2, all the five dimensions except the "efficient" dimension were found to relate significantly with the Adoption Behaviour Scores of farmers. "Experienced" and "innovative" dimensions were relating at $p=0.05$, "progressive" at $p<0.05$ and "proper" at $p<0.01$.

The "cause and effect" cannot be predicted from the above relationships, i.e it is not possible to tell whether the self images of the farmers affected the adoption behaviour of farmers or the adoption of innovations have led to modification in the self images. However, it is likely that the high association of the self image (Cognized Self) with the adoption behaviour of farmers combined with the statements made by farmers about themselves suggests the importance of the Cognized Self as an explanatory factor for the adoption behaviour of farmers. The results tend to suggest that farmers are adopting to be seen in a positive light by their fellows farmers and are motivated to adopt in order to enhance their images

In Zone1, all the inter-relationships among the five dimensions of the Self-Concept (Cognized Self) were found to be positive and relatively low and significant. In Zone2, the majority of inter-relationships among the five dimensions were found also to be positive and relatively low and significant. This would suggest that it is more likely for farmers who see themselves as "progressive" farmers also see themselves as "efficient", "innovative", "proper" and "experienced", and also this would suggest the importance of all related images. Appendix C.

In Zone1, all the five dimensions which measured the Other Self image were found to be associated positively and significantly with the Adoption Behaviour Scores of farmers. Four out of the five dimensions which were "progressive", "efficient", "innovative" and "proper" were found to be relating significantly with the Adoption Behaviour Scores of farmers at $p<0.01$. The other dimension which was "experienced" was found to be relating sig-

Table 9.31: The relationship between Cognized Self and the Adoption Behaviour Scores of farmers

Dimension	Zone1 (40)		Zone2 (20)	
	r	p	r	p
Progressive	0.5699	<0.01	0.5352	<0.05
Efficient	0.3735	<0.05	0.1933	NS
Innovative	0.7269	<0.01	0.5285	0.05
Proper	0.5795	<0.01	0.6066	<0.01
Experienced	0.6208	<0.01	0.4394	0.05

Table 9.32: The relationship between Other Self and the Adoption Behaviour Scores of farmers

Dimension	Zone1 (40)		Zone2 (20)	
	r	p	r	p
Progressive	0.5999	<0.01	0.6946	<0.01
Efficient	0.4993	<0.01	0.2053	NS
Innovative	0.6828	<0.01	0.3420	Ns
Proper	0.8043	<0.01	0.7274	<0.01
Experienced	0.4061	0.01	0.6217	<0.01

Table 9.33: The relationship between Ideal Self and the Adoption Behaviour Scores of farmers

Dimension	Zone1 (40)		Zone2 (20)	
	r	p	r	p
Progressive	0.6934	<0.01	0.4745	<0.05
Efficient	0.5229	<0.01	0.4368	<0.05
Innovative	0.5661	<0.01	0.4830	<0.05
Proper	0.7453	<0.01	0.4676	<0.05
Experienced	0.5656	<0.01	0.6789	<0.01

nificantly with the Adoption Behaviour Scores at p=0.01. In Zone2, three out of the five dimensions which were "progressive", "proper" and "experienced" were found to relate positively and significantly at p<0.01 while "efficient" and "innovative dimensions did not relate significantly.

This again as has been explained above would suggest the importance of the Other Self as an explanatory factor for the adoption behaviour of farmers.

In Zone1, all the inter-relationships except the relationships between "experienced" and "innovative", among the five dimensions of the Self-Concept, (Other Self), were found to be significant and related positively but rather low. In Zone2, the majority of the inter-relationships among the five dimensions of the Other Self were found to be significant and related positively but rather low. This again would suggest that it is likely for farmers who perceived themselves as others saw them as "progressive", also saw themselves as "efficient", "innovative", "proper" and "experienced" farmers, Appendix C.

In both zones, all the five dimensions which measured the Ideal Self were found to be individually relating significantly with the Adoption Behaviour Scores of farmers. All the five dimensions were found to relate at p<0.01. In Zone2, all the five dimensions except "experienced" were found to relate significantly at p<0.05 while "experienced" was relating at p<0.01. This

again, reinforced with statements made by the farmers would suggest the importance of the Ideal Self image as an explanatory factor for the adoption behaviour of farmers.

In Zone1, all the inter-relationships among the five dimensions of the Ideal Self except the relationships between "experienced" and "innovative" were found to be significant and positive but rather low. In Zone2, all the inter-relationships among the five dimensions were found to be positive and half of them were significantly related but rather low. This again would suggest that it likely that farmers who would like to be seen as "progressive" also would like to be seen as "efficient", "innovative", "proper" and "experienced" farmers and this again would suggest the importance of all the related images, Appendix C.

In Zone1 when the three components of the Self-Concept, "Cognized self", "Other self" and "Ideal self", for each of the five mentioned dimensions were combined together to form a generalized image score for each of the five dimension and were then correlated with the Adoption Behaviour Scores of farmers, every one of the five dimensions showed a significant association. In Zone2, the same situation was revealed, the only difference being that "efficient" dimension did not relate significantly with the Adoption Behaviour Scores of farmers, Table 9.34.

Table 9.34: The relation between amalgamated Self-Concept Scores (Cognized Self, Other Self and the Ideal Self) and the Adoption Behaviour Scores of farmers

Dimension	Zone1 (40)		Zone2 (20)	
	r	p	r	p
Progressive	0.6974	<0.01	0.6749	<0.01
Efficient	0.5560	<0.01	0.3054	NS
Innovative	0.6772	<0.01	0.4723	<0.05
Proper	0.7767	<0.01	0.7080	<0.01
Experienced	0.6294	<0.01	0.7130	<0.01

A general self image score was formulated as follows. The total scores for the three "Selfs" in relation to the five describing dimensions of self were calculated for every individual farmer where the maximum score is combined (5x5)+(5x5)+(5x5)=75 while the minimum score is (1x5)+(1x5)+(1x5)=15. These scores in each zone showed a highly significant association with the Adoption Behaviour Scores of farmers, r=0.6504 and r=0.6472 for Zone1 and Zone2 respectively. Both associations were significant at $p<0.01$, Table 9.35.

In both zones, all the inter-relationships (the majority of them were found to be inter-related significantly) between the five dimensions of the Cognized Self and all of the related sub components under the Current Component headings (eg. "innovation is compatible with farm equipment", "view of being the first to adopt" etc.) were found to be relating positively with each other. More specifically, the highest and most significant inter-relationships were found between the five dimensions of the Cognized Self, and all of the sub components, eg. "innovation is risky", "speed of adoption", "view of being the first to adopt" and the "compatibility of innovations". Also, similar inter-relationships were found when the five dimensions of the Other Self and Ideal Self were inter-related with the related sub components under the Current Component. This would suggest the importance of the Cognized, Other and Ideal Self in affecting adoption behaviour as well as to other psychological factors, mainly "risk taking" and the perception of the "compatibility of innovations", see also Appendix C.

It is clear that a significant part of the explanation for the failure in the adoption behaviour of farmers was due to the self image of farmers which might influence their socio-economic, institutional and communicational factors, as will be discussed later in the conclusion of this chapter, see Appendix C. So, the better attitude farmers hold about themselves the better the adoption of the farm innovations was found. Similarly, adoption behaviour of farmers was affected by risk taking as well as the "compatibility of innovations".

It can be concluded that, a negative attitude towards the self associated with uncertainty as well as the lack of the "compatibility of innovations"

together create a severe constraint on the adoption of innovations by farmers.

Table 9.35: The relation between Self-Concept scores (generalized Cognized Self, Other Self and the Ideal Self) and the Adoption Behaviour Scores of farmers

Dimension	Zone1 (40)		Zone2 (20)	
	r	p	r	p
1.Total scores of Cognized Self	0.5758	<0.01	0.6086	<0.01
2.Total scores of Other Self	0.6674	<0.01	0.6452	<0.01
3.Total scores of Ideal Self	0.6387	<0.01	0.6496	<0.01
4.(1+2)	0.6495	<0.01	0.6381	<0.01
5.(1+3)	0.6147	<0.01	0.6342	<0.01
6.(2+3)	0.6695	<0.01	0.6590	<0.01
7.(1+2+3)	0.6504	<0.01	0.6472	<0.01

9.4 Future component

The Future Component includes four sub components. These are "willingness to learn", "willingness to change", "desire to be well off" and "the degree of satisfaction with the progress in farming". These were investigated by gaining farmers' attitudes to various statements.

9.4.1 Willingness to learn

Farmers were given a range of answers to choose from, after being given a range of statements.

9.4.1.1 "My reaction to defeat in an agricultural argument"

Most farmers, 80%, have picked up just one answer out of three answers "I wish to be like him", 15% have chosen this answer plus "increases the other's status", 1.7% have also chosen the answer "I wish to be like him" and also the answer "blame your self", Table 9.36.

In Zone1, about half of the HIGH adopters have chosen just one statement, compared to 82.6% and 70% of the MEDIUM and LOW adopters

respectively. More than a quarter of the HIGH adopters, 28.6%, have chosen two statements, compared to 17.4% of the MEDIUM adopters and 30% of the LOW adopters. None of the MEDIUM and LOW adopters have chosen all the three answers, while another 28.6% of the HIGH adopters did so. In Zone2, all the HIGH and MEDIUM adopters chose just one statement compared to 88.9% of the LOW adopters, Table 9.37.

The idea here is that if a farmer was ready to accept the defeat in the argument and reacted to it positively he would be expected to benefit from the experience of others and learn from them. This was expected to be associated significantly with the Adoption Behaviour Scores of farmers.

In Zone1, a positive and significant association was found between the degree to which farmers responded to the defeat in arguments and their Adoption Behaviour Scores, r=0.3532 which is significant at $p<0.05$. In Zone2, a negative and weak relation was found between the reaction to defeat in arguments and the Adoption Behaviour Scores of farmers, r=-0.0831. This would emphasise the importance of this factor for the adoption behaviour of farmers in Zone1 but not in Zone2.

Table 9.36: The distribution of farmers by their reaction to defeat in agricultural arguments with others

Statement	% of farmers in both zones	% of farmers in Zone1 (40)	% of farmers Zone2 (20)
a."Increase the other's status"	-	-	-
b."Blame yourself"	-	-	-
c."Wish to be like him"	80.0	72.5	95.0
d."Do not care"	0.0	0.0	0
e.(a+c)	15.0	22.5	0.0
f.(b+c)	1.7	-	5.0
g.(a+b+c)	3.3	5.0	-

Table 9.37: The distribution of HIGH, MEDIUM and LOW adopters according to their reaction to defeat in agricultural arguments

Statement	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23) ..	L (10)	H (3)	M (8)	L (9)
a."Increase the others status"	-	-	-	-	-	-
b."Blame your self"	-	-	-	-	-	-
c."Wish to be like him"	42.9	82.6	70.0	100.0	100.0	88.9
d."Do not care"	0.0	0.0	0.0	0.0	0.0	0.0
e.(a+c)	28.6	17.4	30.0	0.0	0.0	0.0
f.(b+c)	-	-	-	-	-	11.1
g.(a+b+c)	28.6	0.0	0.0	0.0	0.0	0.0

H: HIGH adopters, M: MEDIUM adopters, L: LOW adopters

9.4.1.2 "My reaction to news"

This was assessed by asking farmers reaction to hearing news. Over half of the farmers, 53.3%, wanted to know everything and in detail about any leaked news, 23.3% wanted to know a little and other 23.3% did not care at all about the news, Table 9.38.

In Zone1, the percentage of the HIGH adopters who wanted to know everything and in more detail was found to be 57.1%, compared to 60.9% and 30% of the MEDIUM and LOW adopters respectively. In Zone2, only 33.3% of the HIGH adopters wanted to know everything about the news compared to 62.5% and 55.6% of the MEDIUM and LOW adopters respectively, Table 9.39.

In both zones, a positive relation was found between the degree to which farmers have reacted to the news and their Adoption Behaviour Scores for the farm innovations, r=0.3461 and r=0.3401 for Zone1 and Zone2 respectively. The degree of association was found to be significant at $p<0.05$ in Zone1 while this in Zone2 was not significant. This would suggest the importance of this factor and might explain the effect of the size of the sample.

Table 9.38: The distribution of farmers by their reaction to news

Reaction	% of farmers in both zones.	% of farmers in Zone1 (40)	% of farmers in Zone2 (20)
"Did not respond"	23.3	20.0	30.0
"Wanted to know a little more"	23.3	27.5	15.0
"Wanted to know in detail"	53.3	52.5	55.0

Table 9.39: The distribution of HIGH, MEDIUM and LOW adopters according to their reactions to news

Reaction	% of farmers in Zone1 (40)			% of farmers in Zone2 (20)		
	H (7)	M (23)	L (10)	H (3)	M (8)	L (9)
"Did not respond"	0.0	17.4	40.0	0.0	25	44.4
"Wanted to know a little more"	42.9	21.7	30.0	66.7	12.5	0.0
"Wanted to know in detail"	57.1	60.9	30.0	33.3	62.5	55.6

9.4.2 "Willingness to change"

Farmers were asked about their willingness to change. The majority of the farmers, 65%, completely agreed with the statement "I am willing to change", 23.3% did not believe at all that it is necessary, and 11.7% were found in between, Table 9.40.

In Zone1, all the HIGH adopter farmers believed that their agricultural style has to be changed compared to 73.9% and 30% of the MEDIUM and LOW adopters respectively. In Zone2, also, all the HIGH adopters completely believed in the above statement compared to 50% and 55.6% of the MEDIUM and LOW adopters respectively, Tables 9.41 and 9.42.

In both zones, a positive association was found between the belief that they had to be willing to change and the Adoption Behaviour Scores of farmers, r=0.4698 and r=0.3547 for Zone1 and Zone2 respectively. The degree of association was found to be significant at $p<0.01$ in Zone1 while this association was not significant in Zone2 even at p=0.05. This perhaps suggests that adoptive farmers are more willing to change.

9.4.3 "Satisfaction with progress in farming"

Less than half of the farmers, 43.3%, were found to be "not satisfied at all with their progress in farming", 26.7% were "completely satisfied" and 30% were found in between, Table 9.40.

In Zone1, surprisingly, the majority of the HIGH adopters, 71.4%, were "not satisfied at all" with their progress in farming compared to 39.1% and 30% of the MEDIUM and LOW adopters respectively. In Zone2, all the HIGH adopters were found to be "not satisfied at all with their progress in farming" compared to 37.5% and 33.3% of the MEDIUM and LOW adopters respectively, Tables 9.41 and 9.42.

In both zones, a negative association was found between the degree of satisfaction towards the progress in farming and the Adoption Behaviour Scores of farmers, r=-0.3639 and r=-0.3773 for Zone1 and Zone2 respectively. The association in Zone1 was significant at $p<0.05$ but this in Zone2 was not. This suggests surprisingly that HIGH adopters were less satisfied with progress than LOW adopters. Perhaps the wish of HIGH adopters to adopt innovations was not completely met or else the results merely lead to a

realization that may had to make further change in order to progress further. Their level of satisfaction and aspirations were not yet met.

9.4.4 "Desire to be well off"

Only, 8.3% of the farmers "did not want to be well off", 48.3% "liked to be well off" and 43.3% were found in between, Table 9.40.

In Zone1, none of the HIGH and MEDIUM adopters were found to "dislike being well off" compared to 10% of the LOW adopters. In Zone2, none of the HIGH adopters were found to "dislike being well off" compared to 12.5% and 22.2% of the MEDIUM and LOW adopters respectively, Tables 9.41 and 9.42.

In both zones, a positive and significant relationship was found between the "desire to be well off" and the Adoption Behaviour Scores of farmers, r=0.4411 and r=0.5149 for Zone1 and Zone2 respectively. Both associations were significant at $p<0.01$ and $p<0.05$ respectively, the conclusion is that HIGH adopters have a strong "liking to be well off".

Table 9.40: The distribution of farmers by their Future Component

Statement	% of farmers in both zones			% of farmers in Zone1			% of farmers in Zone2		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1."Willing to change"	65.0	11.7	23.3	67.5	15.0	17.5	60.0	5.0	35.0
2."Desire to be well off"	48.3	43.3	8.3	55.0	40.0	5.0	35.0	50.0	15.0
3."Satisfaction with progress in farming"	26.7	30.0	43.3	25.0	32.5	42.5	30.0	25.0	45.0

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree

9.4.5 Summary and Conclusion on Future Component

In Zone1, all the five sub components under the Future Component were found to relate significantly with the Adoption Behaviour Scores of farmers. "Willingness to change" and "desire to be well off" were found to relate at $p<0.01$ while "defeat in arguments", "reaction to news" and "satisfied with progress in farming" were found to relate at $p<0.05$. In Zone2, only "desire

Table 9.41: The distribution of the HIGH, MEDIUM and LOW adopters in Zone1 according to their Future Component

Statement	% of H adopters			% of M adopters			% of L adopters		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1."Willing to change"	100.0	0.0	0.0	73.9	8.7	17.4	30.0	40.0	30.0
2."Desire to be well off"	85.7	14.3	0.0	56.7	43.5	0.0	40.0	50.0	10.0
3."Satisfaction with progress in farming"	0.0	28.6	71.4	26.1	34.8	39.1	40.0	30.0	30.0

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree, H: HIGH, M: MEDIUM, L: LOW

Table 9.42: The distribution of the HIGH, MEDIUM and LOW adopters in Zone2 according to their Future Component

Statement	% of H adopters			% of M adopters			% of L adopters		
	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis	Ag.	Ag.in	Dis
1."Willing to change"	100.0	0.0	0.0	50.0	12.5	37.5	55.6	0.0	44.4
2."Desire to be well off"	100.0	0.0	0.0	37.5	50.0	12.5	11.1	66.7	22.2
3."Satisfaction with progress in farming"	0.0	0.0	100.0	50.0	12.5	37.5	22.2	44.4	33.3

Ag.: Agree, Ag.in: Agree in part, Dis: Disagree, H: HIGH, M: MEDIUM, L: LOW

to be well off" was found to relate significantly at p<05.

Table 9.43: The relation between Future Component and the Adoption Behaviour Scores of farmers

Statement	Zone1 (40)		Zone2 (20)	
	r	p	r	p
1."Defeat in arguments"	0.3532	<0.05	-0.0831	NS
2."Reaction to news"	0.3461	<0.05	0.3401	NS
3."Willing to change"	0.4698	<0.01	0.3547	NS
4."Desire to be well off"	0.4411	<0.01	0.5149	<0.05
5."Satisfaction with progress in farming"	-0.3639	<0.05	-0.3773	NS

The inter-relationships among the five related factors, for some factors, were found to be significant. The highest inter-relationships was found between the degree of "satisfaction in progress in farming" and "willingness to change". The more satisfaction towards the progress in farming the farmer has the more likely for him "not to like to change", (see also Appendix C)

Most of the inter-relationships between "willingness to change" and "desire to be well off" on the one side and all of three components of the Self Concept (Cognized Self, Other Self, and Ideal Self) concerning the five dimensions ("progressive", "innovative", "efficient", "proper", and "experienced") on the other side were found to relate positively and significantly. This would suggest that farmers who were "willing to change" and "liked to be well off" were also found to have a positive attitude towards their self. The rest of other sub components of the Future Component were found to relate positively but not significantly.

It can be concluded that the Future Component has an important effect on the adoption behaviour of farmers.

9.5 Conclusion

9.5.1 Summary of the psychological factors

In both zones, the results of the Psychological factors might suggest that the decision maker was found to be influenced by the mechanism of different tensions, i.e pulls in different directions, when he decides to adopt innovations . These tensions originated from his spiritual belief (Spiritual Component), traditional belief (Ancestor and Past Component), the current situation (Current situation Component) and from the way he looks to the future (Future Component). However, the spiritual belief tension and traditional belief tension have shown weak relations with the Adoption Behaviour Scores of farmers while the tension of Current and Future show high relationships with the Adoption Behaviour Scores of farmers. In comparison between the tension which comes from the current situation and the one which comes from the way the farmer looks to the future, the first one was found to be stronger and more dominant than the other. This was indicated by their relationships with the Adoption Behaviour Scores, most of the associations under the Current Situation Component with the Adoption Behaviour Scores of farmers, particularly those related to Self Concept (Cognized, Other and Ideal), "risk taking" and "compatibility of innovations", were found to be associated at $p<0.001$. While the majority of the associations under the Future Component were found to relate at $p<0.05$. Also the inter-relationships among factors under the Current Component were found to be higher than the inter-relationships among factors under the Future Component. However, the future is important and some farmers who look to the future in a positive way, i.e, they are not happy with their progress in farming therefore they would like to change in order to change their position and become better off, are willing to learn to get benefits. Yet when they look to their current situation they might get frustrated. This is because the tension of the Current situation is stronger and dominant and more effective to cause any action or change. They are afraid of risk ("Uncertainty about innovations" as well as to "uncertainty about the weather conditions"), they have a negative attitude towards their Self, i.e they do not consider themselves as "proper" or "progressive" farmers, and they feel

the "innovation is incompatible" with their farms. As a consequence the decision to adopt an innovation was suspended or diminished by the Current tension. This would lead one to conclude that "uncertainty" associated with negative attitude towards self as well as to the association of the lack of the compatibility of the innovation made a severe constraint for the adoption of innovations by farmers.

However, since a lot of relations between Psychological factors and other factors such as the Personal and Socio-economic and Communicational existed, it was felt that it was not possible to discuss each relationship separately. Thus there follows a discussion about these relations in general terms with the most distinctive relationships singled out. It is worth noting that factors which are discussed are only the ones which showed significant association with the Adoption Behaviour Scores of farmers. A distinction is also made between the Psychological factors (excluding the Self Concept) and the relationship with the Self Concept.

9.5.2 The relationships between the Psychological factors and the Personal and Socio-economic factors

In Zone1, 89% of the relationships between the Personal and Socio-economic factors and Psychological factors (all Psychological factors except the Self Concept) were found to be positive, (Appendix C). "Family education" of the Personal and Socio-economic factors was found to be the most related factor with the Psychological factors. It related significantly with 47% of the statements of the Psychological factors. "Innovation is compatible", "speed of adoption" and "desire to be well off" of the Psychological factors were found to be the most related factors with Personal and Socio-economic factors. They, respectively, related significantly with by 80%, 60% and 60% of the statements. (Appendix C). In Zone2, 100% of the relationships between the Personal and Socio-economic factors and Psychological factors were found to be positive. (Appendix C). Again "innovation is compatible" of the Psychological factors was found to be the most related factor. It related very highly and significantly with "farm size" and "family size" of the Socio economic factors. (see Appendix C). However, the high percentages of the positive relations among these factors would suggest that most of these

factors were found to work together in some way for all farmers. The low level of significancy among these factors would reflect different degrees of importance for these factors among farmers. For example, education could be a problem for some farmers but it would not necessarily be a real problem for other farmers. This would make the situation for changing farmers' adoption behaviour even harder and this would necessitate all related factors to be treated because the change in one factor might not lead to a change in another factor.

9.5.3 The relationships between the Psychological factors and the Economic and Institutional factors

In Zone1, most of the relationships between the Economic and Institutional factors and the Psychological factors were found to be positive, Appendix C. The most distinctive relationships were found between "the general perception of the cost of innovations" and the Psychological factors. It related significantly with 65% of the Psychological factors statements. "Innovation is compatible", "speed of adoption", "willing to change" and "family burden" were found to be the most distinctive ones of the Psychological factors. They respectively related significantly with the Economic and Institutional behaviour by 83%, 83%, 50%, 50% and 50%, Appendix C. In Zone2, all the relationships between Economic and Institutional factors and Psychological factors were found to be positive, Appendix C. The most distinctive relationships were found between "the compatibility of innovations" of the Psychological factors and Economic and Institutional factors. It related significantly with 67% of the Economic and Institutional factors statements, Appendix C.

9.5.4 The relationships between the Psychological factors and the Communicational factors

The relationships between the Communicational factors and other Psychological factors were found almost to be the same as the previous relationships with other factors. Most of the inter-relationships, 98%, were found to be positive, Appendix C. "Innovation is not risky", "not satisfied with progress in farming", "speed of adoption", "innovation is compatible" and "willing-

ness to change" were found to be the most distinctive factors of the Psychological factors to relate with Communicational factors. They respectively related significantly with the Communicational factors by 83%, 83%, 83%, 75%, and 75%. "Involvement in Extension plot" of the Communicational factors was found to be the most distinctive factor of the Communicational factors to relate with the Psychological factors. It related significantly with 59% of the statements of the Psychological factors, Appendix C.

9.5.5 The relationships between the Self-Concept and all of the Personal and Socio-economic, Economic and Institutional, and Communicational factors

Concerning the relationships between the Self Concept of farmers on the one side and all of Personal and Socio-economic, Economic and Institutional, and Communicational factors on the other side, in Zone1 particularly, the majority of the relationships were found to be significant and almost all to be positive but rather low, (Appendix C). This would suggest with no doubt that the problem of promoting and speeding up the adoption of innovations by farmers is not a matter of tackling the socio-economic, institutional and communicational factors alone, but it is also a matter of involvement of a consideration of the farmers' Self-Concept.

Table 9.44: Summary of the characteristics of the HIGH, and LOW adopters in relation to Personal and Socio-Economic, the Economic and Institutional,Communicational and Psychological variables

HIGH adopters	LOW adopters
Zone1	
Have fragmented farms	Have consolidated farms
Have large family	Have small family
Live in extended family	Live in nuclear family
Literate	Illiterate
Have educated family	Have family which is not educated
Have well equipped farms	Have farms which are not well equipped
Have good road conditions	Have poor road conditions
Perceive the accessibility of innovations as easy	Perceive the accessibility of innovations as difficult
Own cash is available	Lack of own cash
Wheat is a cash crop for them	Wheat is more of a subsistence crop
Perceive the accessibility of Extension as easy	Perceive the accessibility of Extension as difficult
See that innovations are cheap	See innovation as expensive
All utilized four or more sources of information	Most utilized three sources or less
Most of them visit extension agent	Very few visit extension agent
Majority been visited by by extension agent	None was visited
Majority visit the cooperative	Few visit the cooperative

Most were involved in the extension plot	None were involved in the plot
Most watch television spots	Majority watch television spots
Regularly	but few watch regularly
Majority listen to radio occasionally	Most did not listen at all
Less than half read publications	None was reading publications
All believe in the role of money in bringing happiness	Only half believe in the role of money in bringing happiness
Feel family not a burden	Feel family is a burden
Feel that they are fortunate	Feel that they are unfortunate
Highly value indigenous knowledge	Do not value indigenous knowledge
Have favourable attitude towards rain-fed farming	Have unfavourable attitude towards rain-fed farming
Risk taker	Risk avoider
See the compatibility of of innovations with farm equipment	See the incompatibility of innovations with farm equipment
Progressive*	Traditional*
Not as efficient as could be*	Not efficient*
Innovative*	Not innovative*
Proper farmer*	Not proper farmer*
Relatively experienced*	Not experienced*

Zone2

Third of them have farm size above 50 hectare	None has farm size above 50 hectare
Large family is more dominant	Average and small family are more dominant
Third have their own farm equipment and machinery	None have equipment and machinery
Own cash is available	Lack of own cash
Many see that innovations are cheap	Most see innovations as expensive
All believe in the role of money in bringing happiness	Majority disbelieve in the role of money in bringing happiness
Have favourable attitude towards rain-fed farming	Have unfavourable attitude towards rain-fed farming
Risk taker	Risk avoider
Third see the compatibility of innovations with their farm equipment	All see that there is an incompatibility with their farm equipment
Progressive*	Traditional*
Not as efficient as it could be*	Not efficient*
A third are proper farmers	None are proper

*: Based on Cognized Self

CHAPTER 10

Conclusion

10.1 The adoption behaviour of farmers

The results in the previous chapters show that none of the nine selected innovations and improved practices was found to be completely adopted by every farmer., i.e. for no innovation did 100% of the farmers adopt the practice. Similarly none was found to be adopted at a rapid rate. The date and the rate of adopting innovations by farmers were found to vary considerably from one farmer to another.

Only 7% of the farmers were found to have adopted all the nine selected innovations and improved practices, 22% adopted from 7 to 8 of them, 30% adopted from 5 to 6 of them, 30% adopted 3 to 4 of them and 12% adopted 1 to 2 innovations and improved practices.

The summary at the end of Chapter 9 provides a succinct analysis of the characteristics of high adopters and low adopters. It is clear that there are distinct characteristics of the high adopter farmers. These factors are considered here in terms of the Adoption Behaviour Scores.

The Adoption Behaviour Scores of farmers were constructed by considering the date of first adoption and the continuity of adoption for the nine selected innovations and improved practices. Only 13% of the farmers had Adoption Behaviour Scores above 40 (the maximum score is about 81), 52% had scores of between 20 and 39, and 35% had scores of less than 20.

The above range of values can be summarized by the following:

- Generally a low adoption rate for the nine innovations and improved practices was found.
- There was a considerable variation in the date of uptake of the innovations and improved practice by farmers.

- The speed of uptake of the innovations was low.
- Most of farmers were found to be medium or low adopters.

10.2 Factors related to the adoption behaviour of farmers

A summary of the results of correlation coefficients analysis of factors associated with the Adoption Behaviour Scores of farmers are displayed in Appendix F. The magnitude of the correlation coefficient varied considerably from one factor to another. The related factors can be classified into three categories according to their magnitude of correlation with the Adoption Behaviour Scores of farmers. Firstly; factors correlated at $p \leq 0.05$, (r=0.3088 to less than 0.4030 for Zone1 and r=0.4440 to less than 0.5610 for Zone2). Examples of these factors are "literacy", "reading of extension publications", "the ease of access to innovations". Secondly; factors correlated at $p \leq 0.01$, (r=0.4030 to less than 0.5013 for Zone1 r=0.5610 to less than 0.6787 for Zone2). Examples of these factors are "family size and education", and "watching television programme". Thirdly; factors correlated at $p \leq 0.001$, $r \geq 0.5013$ for Zone1 $r \geq 0.6787$ for Zone2. Examples of these factors are the "perception of the cost of innovations", "availability of credit and cash money", "availability of machinery and equipment", "having an Extension plot on farm", and "Self-Concept scores". This would suggest that the uptake of innovations and improved practices by farmers was found to relate to a complexity of factors. Table 9.44 displays most of the factors significantly related to the Adoption Behaviour Scores of farmers. This table, as has been mentioned earlier, shows the characteristics of the high and low adopters. There are clear distinctions between the characteristics of the high and low adopters but for a few factors a small number of the low adopters were found to have similar characteristics to the high adopters. The magnitude of the correlation coefficient indicates the degree to which a factor is a good discriminator. A high correlation coefficient indicates a better discriminator than a low correlation coefficient.

There was no one characteristic that was totally unique to the high adopter farmers. For example, one might find a farmer who is literate and sees himself as progressive farmer but he is a low adopter and at the same

time one might find a farmer who is illiterate and sees himself as traditional farmer but he is high adopter. However, the summary characteristics in Chapter 9 has highlighted key factors and those factors which are statistically correlated are highlighted in order to postulate a general model of adoption behaviour.

10.3 The crucial factors for the adoption behaviour of farmers

Since numerous factors were found to relate significantly with the adoption behaviour of farmers, it is felt that it is necessary to identify the key factors which can together reflect the highest variation in the adoption behaviour of farmers. This is very important in terms of constructing a conceptual model for this study that can help in the prediction of the adoption behaviour of farmers. Consequently this would help in dealing more efficiently with farmers as well as saving time, money and effort on the part of the policy makers for achieving desirable change in the adoption behaviour of farmers.

Although human behaviour is not static or simple, it can be predicted under particular conditions where people live and interact. This requires these conditions to be analysed and understood. However, on the basis of the data of this research it is possible to draw a conclusion about the crucial factors or forces that can help in predicting the adoption behaviour of farmers with respect to innovations and improved practices. This can be done by developing the best linear equation (step by step analysis) to evaluate the theoretical model for this research in terms of the adoption behaviour of farmers. This is done on the basis of the related variables defined through multiple regression analysis. The multiple regression equation used was as follows.

$$Y = a + b1X1 + b2X2 + \text{----------} + bnXn$$

Where Y is the dependent variable (i.e. the Adoption Behaviour Scores of farmers), X's are the independent variables (i.e. education, Self concept, communication), b's are regression coefficients, eg. b1 measures the expected change in Y when X1 increases by one unit while X2 remains unchanged, a is a constant.

The results of this analysis have been displayed in Appendix F. It has been found that the best combination of factors to explain the adoption behaviour of farmers in Zone1 was the combination of the "Self Concept score" of being "a proper farmer", having an "Extension plot or field demonstration on the farm" and the "accessibility of credit and the availability of cash money". This combination for the three factors as scored in the analysis explains 74.3% of the variation in the adoption behaviour scores of farmers.

The relation between "properness" and the adoption behaviour of farmers has been discussed fully in Chapter 9. It was indicated that farmers were more likely to innovate because they see themselves as "proper" and not describing themselves as "proper" because they innovate.

Adoption Behaviour Scores
of farmers (Y)= [-5.06 + 6.90 (Self-Concept) +
(SE: 1.59)
4.05 (Having an Extension
plot on farm) +
(SE: 1.61)
4.46 (Availability of credit
and cash money)].
(SE: 1.67)

F ratio = 11.03 which is significant at $p<0.01$

Availability of credit and cash money is the degree to which money were available to farmers in order to buy inputs, (see Chapter 7).

In Zone2, the combination of the "Self Concept score" of being "progressive" and the "availability of machinery and equipment on the farm" shows the highest explained variation in the value of the adoption behaviour scores of farmers. This combination explains 67.1% of the variation in the adoption behaviour scores of farmers.

Adoption Behaviour Scores
of farmers (Y) = [3.08 + 5.92 (Self-Concept) +

(SE: 1.39)

6.57 (The availability of machinery and equipment on farm)]

(SE: 2.10)

F ratio = 9.08 which is significant at p<0.01

Machinery and farm equipment are very important aspects for wheat growers in both zones, i.e. they are very necessary for sowing, tillage, spraying herbicides and pesticides, broadcasting fertilizers etc., however, the variable in Zone2 could be exaggerated. This is because there are only three farmers with high Adoption Behaviour Score in Zone2.

As another approach the Zone1 model was applied to Zone2, the variation in adoption behaviour explained by that model was found to be 60.6%.

Adoption Behaviour Scores of farmers (Y)= [0.85 + 6.70 (Self-Concept) -

(SE: 1.78)

3.72 (Having an Extension plot on farm) +

(SE: 2.66)

4.23 (Availability of credit and cash money)].

(SE: 2.16)

F ratio = 3.81 which is not significant

Although the last two variables in the equation did not add a significant variation to the adoption behaviour of farmers, the model seems to be relevant to Zone2 particularly if the difficulties which were raised in Chapter 5 have been taken into account.

However, considering farmers in Zone1 and Zone2 as one group, then the best combination of factors to explain the adoption behaviour of farmers were found to be similar to those appear in the above models. The factors

appear in the model were found to be "the availability of machinery and equipment on the farm", "the availability of credit and cash money", the Self-Concept of being "experienced" and "having an extension plot on the farm". The four variables explain 62% of the variation in the adoption behaviour of farmers, see Appendix F.

In general terms the "Self Concept measures", particularly "progressiveness" and "properness"; "having an Extension plot on the farm"; "availability of credit and cash money", and the compatibility of innovations ("availability of machinery and equipment on the farm) are the best explanatory factors for the adoption behaviour of farmers in this study.

However, before drawing the final recommendations on how to deal with the potential factors efficiently in order to achieve the desirable change in the adoption behaviour of farmers, some issues concerning these factors have to be discussed first.

10.3.1 Availability of credit and cash money

It has been shown that the majority of the sampled farmers, 72%, were found to be in need of credit. Only a minority of farmers, 37%, who were in need of credit had been able or were willing to obtain it while the majority, 63%, were not. The availability of credit to a large extent has helped these farmers to adopt innovations in order to be able to emulate the others who had their own cash money. The majority, who were in need of credit were not able to get it or were not willing to get it. This mostly was, as farmers said, because of the fear of the risk in credit, "not being able to pay it back", "for religious reasons against paying interest", "no need for it because the availability of cash money with them", or for reasons of "difficulty in obtaining", (see Chapter 7). Consequently, this has left a fairly large percentage of farmers using primitive methods of farming which in turn had led several farmers, some of them are included in the sample, to think seriously about giving up farming. Some in the sample said that they would hand their land to some progressive farmers, who can work the land properly.

However, results throughout this thesis have shown the importance of risk as an explanatory factor for the adoption behaviour of farmers. Risk taking of the farmers was measured by different methods and each one re-

vealed that not many farmers were found to be risk takers or had a positive attitude towards risk taking. Therefore, one should not expect, by any means, that to speed up the adoption of the future innovations or to persuade farmers to obtain credit is an easy task particularly under rain-fed farming conditions. To change the behaviour some incentive measures need to be taken.

Rain-fed farming is usually associated with greater risk than any other type of farming. Under these circumstances for a farmer to be a risk taker would be a very important factor for the adoption of innovations particularly when capital is not available. If the farmer has a positive attitude towards risk or considers himself as a risk taker then he might not be hesitant to adopt even if he has not got cash of his own. This has been confirmed by the result of this research that the lack of money by itself was not considered to be a problem for adoption of innovations since farmers who were prepared to take a risk can get credit. Availability of credit and cash money were found to relate positively and significantly with different measurements of risk taking by farmers. This would suggest that farmers who made use of credit or have their own cash money were found to be more prepared to be a risk taker than those who had not, 67% of the farmers who did not obtain credit consider themselves as "not a risk taker" or have a negative attitude towards risk taking. The lack of cash was a major problem for the adoption of innovations only if the farmer considers himself as "not a risk taker" or considers "credit as not worth while".

All the relationships between "accessibility of credit and availability of cash money" and all of the Self Concept measures regarding "progressiveness", "properness", "efficiency", "experienced" and "innovativeness" were found to be positive and most of the relationships, particularly in Zone1, were found to be significant. This might suggest that the problem of farmers not accepting credit is not merely because of the fear of not paying it back, it is also because of the conflict with the images of the self, i.e. "credit is not for me, it is restricted for farmers who are risk takers and who can deal with it properly", some farmers said "I am not able to do this". Others said: "I have not got the type of farming which warrants credit, it is all right to

me to be without credit". " I get fed up with farming, I tried to modernize my agriculture by using the latest technology and innovations, I could not because I was not able to save some money to buy these innovations. The credit is there but I do not like to take risk by obtaining it. I might not be able to pay it back, I am not risk taker. Therefore I decided to give my land to some farmer who can serve them better than me, he has the money and he can get credit because he is risk taker and he knows how to deal with the credit properly. I talked to him, he is going to take the land from me next year".

In fact farmers were serious in their talk about giving up farming because some of farmers had already handed their farms to other farmers, (MUSARIEN).

This is very serious for some farmers, but it might not be the same for the national economy of the country because innovations and technology would pass more easily to these special type of farmers. Consequently this could lead to an increase in agricultural production which in turn this would lead to benefits to national economy as well as to more improvement in condition of living for the MUSARIEN.

However, since the Syrian Government cares about both the welfare of farmers as well as to the economy, this situation might not be desirable. The development of the economy should perhaps take place through the involvement of all farmers, thus avoiding unemployment. Therefore, a solution to stop the handing over of land might be desirable, this will be discussed in the recommendations.

10.3.2 Extension plot or field demonstration on the farm

Farmers in this research were found to utilize several sources, channels, of information in order to obtain knowledge about innovations. There were considerable variabilities in the use of these sources or channels by farmers. In general terms, farmers' utilization of these sources was found to be very limited.

Most of these sources showed a significant and relatively a high relation with the adoption behaviour of farmers. Also, most of the inter-relationships among these sources were found to be positive and significant. This would

suggest that farmers who utilized, for example, "mass media" were most likely also to use another channel such as "face-to face communication".

Farmers' awareness of these sources was found to be low. Also, some farmers who did deal with these sources were found to face great difficulties in obtaining knowledge about innovations.

In order for this study to make a contribution to improving the effectiveness of Extension work in the country, in addition to what has been discussed in Chapter 8, one has to understand the philosophy of Extension in reaching the farming community. This can be achieved through discussing, for example, the involvement of the Extension agent in face to face communication with farmers, i.e. communication which is initiated solely by the Extension agent. This involvement can mainly be done either through his normal visit to farmers or through organising an Extension plot or field demonstration with farmers. The role of extension agent is now considered.

1. A positive and significant relationship was found between the level of Extension agent visit to farmers on the one side and the level of "literacy" among farmers and the level of "family education".

   Also, positive and significant relationships were found between having an Extension plot and the level of "literacy", "family education" and "family size".

   This would suggest that Extension agent was more likely to make contact with literate farmers who have a family with higher level of education and a large size.

2. The level of Extension agent visits was found to relate positively and significantly with machinery and equipment available on the farm, "road conditions", "the general perception of the accessibility of innovations" and the "general perception of the cost of innovations".

   Also having an Extension plot was found to relate positively and significantly with the "availability of machinery and equipment on the farm", "availability of credit and cash money" and "general perception of the cost of innovations".

   This would suggest that the Extension agent was likely to visit and

choose farmers for an Extension plot who have the machinery and equipment facilities, who had better road conditions of their farm, have no problem with the accessibility of innovations, with farmers who see the price of innovations as cheap and have their own cash money or can get credit.

3. A positive and significant relationship was found between the level of Extension agent visits to farmers and the attitude sets of "money brings happiness", "the speed of adoption", "the current farming practice is easier than the one in the past", "innovations are compatible with farm equipment", "reaction to defeat in agricultural arguments", "satisfaction with progress in farming" and "desire to be well off".

   Also a positive and significant relationship was found between having an Extension plot on the farm on the one side and all of "family burden", "innovation is not risky", "view of being the first to adopt", "speed of adoption", "the current farming practice is easier than the one in the past", "innovations are compatible with farm equipment" "reaction to defeat in agricultural arguments", "satisfaction with progress in farming" and the "desire to be well off".

   This would suggest that the Extension agent was more likely to visit and choose farmers for an Extension plot who believe that money can bring happiness and who like to be better off, who are a risk taker, do not feel that their families are a burden on them, who perceive the compatibility and the ease of innovations, who are willing to learn and willing to change.

4. The Extension agent visit was found to relate positively and significantly with the dimensions of the Self-Concept (Cognized self) in relation to the following descriptive words: "progressive", "innovative", "proper farmer" and "experienced".

   Extension agent visit was found to relate significantly and positively with the dimension of the Self-Concept (Other Self) in relation to the following descriptive words: "progressive", "efficient", "innovative" and "proper".

Extension agent visits, also, were found to relate positively and significantly with the dimensions of the Self-Concept (Ideal Self) in relation to the following descriptive words: "progressive", "efficient", "innovative", and "proper" farmer. While Extension plot was found to relate to "progressive", innovative" "proper" and "experienced"

This would suggest that Extension agent was more likely to visit and choose farmers for Extension plots who have a more positive attitude towards the "self".

It can be concluded that Extension policy was more likely to be directed at an easy target population of farmers and left the most difficult targets out. Therefore, it is not surprising that there is a minimal direct use of Extension service by the majority of the farmers in the country.

10.3.3 The compatibility of innovations with farm equipment and machinery

The importance of the compatibility of innovation was likely to come from two issues: Firstly the high demand by wheat innovation and improved practice for machinery and equipment. Secondly there were no organisations to provide farmers with successful mechanization services. The exception being one for herbicides and a very few village cooperatives for cultivations. Farmers who have no machinery and equipment have to rely heavily on hiring them from the private sectors, i.e. from other farmers, 68% of the farmers were found to be completely dependent on hiring machinery from outside. Most of the farmers who see the lack of the compatibility of innovations considered that the accessibility of machinery and equipment was very difficult and the price for hiring them was so high. Consequently this has been reflected in their low adoption behaviour.

The seriousness of this factor can also be reflected from farmers' comments about the accessibility and the cost of innovations, (input and output). The majority of the farmers were found to repeat the same statements: "I am facing great difficulties in obtaining machinery particularly tractors and lorries. If the owners of that machinery are not friends of yours they would not come to serve you despite we are paying them a high price for

that service". This negative attitude by the owners of the machinery and equipment towards serving the other farmers who do not own them can be explained as follows. Firstly; the owners of the machinery are actually farmers like others, therefore they might have no time to serve the other farmers because they were busy with their farming. Secondly, the price for hiring these machines was considered to be high but the maintenance and replacement parts of this equipment and machinery are themselves very high. Therefore, the owners feel that they were losing money and not gaining it. Lastly, and it could be the most important reason, farmers who own machinery and equipment were better off than those who do not own. Machinery cannot work for other farmers by themselves, they require the owner to be working with them. Therefore the owners of the machinery did not feel comfortable while he, or somebody of his family member, was working for the other farmer who was less important than him, at least in terms of money. The wealthy farmer is in fact more respectable and has a higher prestige than a farmer who is poor. This is thus like an insult to be working for another farmer. This has been indicated by farmers when they were asked about their attitude of hiring out machinery for a living, i.e. to serve the others by that machinery. Most of the farmers who had them and who did not have them out said "we like very much the machinery and equipment for us but we dislike them very much if we are going to have to work for others with them".

10.3.4 The attitude towards the self (Self Concept)

Results concerned with the relationships between the Self-Concept dimensions and the adoption behaviour of farmers indicated that the adoption of innovations and improved practices among the "rain-fed farmers" was not just a matter of optimizing social, economic and communicational conditions in their environment. It, also, is a matter of how farmers perceive themselves in a particular dimension which might influence their social, economic and communicational behaviour.

Considering segment four and five of the dimensions of the Self-Concept as a positive and strong identification of oneself on that dimension, this study has shown that not many farmers have identified themselves on these two

segments for the five descriptive words of "progressive", "efficient", "innovative", and "experienced" for the three Self (Cognized, Other and Ideal). Furthermore no farmer has identified themselves on the fifth segment of the dimension of the Self-Concept (Cognized Self) regarding the descriptive words "progressive" and "proper farmer". The percentage of farmers appearing on the fourth or fifth segment of the dimension of the Self-Concept (Cognized Self) was found as follows; "progressiveness", (27%), "efficiency", (18%), "innovativeness", (30%), "proper farmer", (22%), and "experienced", (15%). While the percentage of farmers appearing on the fourth or fifth segment of the scale of the Self-Concept (Ideal Self) regarding the above five descriptive words was found as follows; "progressiveness", (34"innovativeness", (37%), "proper farmer", (26%), and "experienced", (43%).

The percentages of strong and positive identifications of self showed a slight increases from one self measure to another, particularly from Cognized to Ideal Self, regarding the five descriptive words. This suggests farmers do wish to have a different image of themselves. Their Ideal Self was different in some ways to Cognized Self but not to a very large degree in other words those who saw themselves as "traditional" (Cognized self) wish to see themselves only slightly less "traditional" (Ideal Self). It would suggest few are really willing to change, they appear set and content as they are. They did not appear to wish to move to become "progressive". The results suggest the farmer's image of himself is a relevant factor in understanding his behaviour. If any new idea is perceived by farmers as for those who have a strong and positive identification of self then this might lead to the rejection or delay in adopting the new idea by the majority of farmers who have a negative or neutral identification of self. For example, suppose an innovation is perceived by farmers as related to progressiveness, then few farmers would take it and the majority would consider the innovation as running contrary to their Cognized Self, leading to the state of dissonance. This can be reduced or alleviated by just ignoring the new idea, or by justifying one self for not trying it, or try to interpret the new idea in order to be consistent with ones self (Seabrook and Higgins 1988). Therefore, avoiding conflict with the self-image would be very important for the adoption of innovations. This,

largely, depends on how an innovation is presented to farmers.

However, as has been indicated in Chapter 9 most of the inter-relationships among the five describing words for every self-image (Cognized, Other and Ideal) were found to be positive and significant but rather low. This would suggest the importance of all the five dimension words for the self-image. Also, with the exception of "innovative", the inter-relationships between the three self images recorded for each descriptive word were found to be positive but the majority of the inter-relationships were rather low. This would suggest that the three reported images to some extent were not the same. It must be recognized there are some limitations to the measurement of the self-images. It is difficult for farmers to specify and identify the three images.

1. The way in which the three selfswere presented to farmers might mean that farmers were not always able to discriminate and describe the three self-images, and in consequence made them rather more similar for each dimension.

   To make sure that this similarity in the three Self-Concept is a fact and not caused by other reasons these suggestions are made for future research.

- To interview farmers three times, each time only one of the three self images should be questioned.

- Alternatively if there is just one interview the three self could be distributed through the questionnaire where each self should appear for example in different parts of the questionnaire.

10.4 Recommendations

Innovations are important for Syrian farmers, the majority of farmers were found to be Medium and Low adopters, and since this research is representing the typical type of wheat farmers in the country based on a randomized selection of farmers, the findings of this research must be taken into consideration. Firstly, in order to speed up the adoption of the innovations and secondly to close the gap between HIGH adopters and the LOW and

MEDIUM adopters. This would lead to an increase in farmers' production and this in turn might lead to an improvements in farmers' conditions of living as well as stopping those farmers who are thinking of giving up farming. This gap cannot only be closed solely through the intervention of the Extension Organisation in the country as has been indicated by the findings of this research, i.e. the nature of the factors related to the adoption behaviour of farmers. Government commitment and support through its institutes of research and an improved infrastructure are needed.

On the basis of the findings, a few major implications can be used to build on the recommendations to be taken into consideration by Extension organisations and policy makers. In a hope this would improve the adoption behaviour of farmers as well as to fostering the future release of improved cropping practices.This does not mean that the other findings have to be neglected, Table 9.44. However, the major implications are as follows.

1. There is a lack of cash available by farmers accompanied by a fear of risk in using credit.These were likely to be explanatory factors for the failure to adopt innovations and improved practices by farmers. In Zone1 the combination of the two factors accounted for 55.1% in the variation in the adoption behaviour of farmers while in Zone2 it was 29.0%.

2. A lack of communication and extension support are important factors limiting the adoption of innovations. There is a need for more extension plots on farms.

3. The lack of the compatibility of innovations with farmers' own equipment and machinery played an important role for preventing the adoption of innovations and improved practices by some farmers.

4. The negative attitude towards the self is likely to be an important factor to limit the adoption of innovations and improved practices by some farmers.

10.4.1 Encouraging farmers to obtain loans

Farmers have to be encouraged to get loans particularly a small short term loan and is in kind. This is a very crucial factor for most of farmers

particularly for those with small farm size and who have limited resources of human capital. As has been suggested by the findings of this study the availability of money played an important role in the adoption of innovations by farmers. Based on the findings of this research farmers can be encouraged by the following:

1. Reduce the tension of risk to get loan

   This can be done by:

   - Educating farmers on how to use and exploit credit in an optimal manner. Possibly by telling them to start with borrowing a limited loan to try first on a small scale. Extension workers as well as agricultural bank staff can play an important role in this respect by making farmers aware of the use and the important of exploiting credit made available. Simple words, avoiding written material, physical evidence and pictures would be highly appreciated by farmers in order to understand the credit messages because half of farmers are illiterate and most of the rest are only just able to read, write, and understand.
   - Extension workers also have to organize particular meetings with farmers in a hope that this would improve farmers' attitude towards risk taking by explaining to farmers the possibility of making the use of credit.
   - Subsidizing the loan in a year where there is little or no yield at all. Subsidy like this has to be treated cautiously and should not be applied unless there is a clear evidence from the field. To be cautious is a very important aspect. The evidence from this research suggest that some farmers were found to be not active and depend too greatly on their neighbours for getting their information about farming as well as to other things.
   - For medium loans, the interest rate which has to be paid by farmers should be subsidized as well as postponing the payment (a part of the credit due to be paid) until the next following year

if there was or little yield at that year. This will enable farmers to plan and reduce the risk when there is less rain.

2. Make the access to credit easier

   This can be done by the following:

   - Taking off the interest rate or at least find a justification for it by creating a new word or actions which cannot contradict with farmers values and beliefs.
   - Reducing the complexity of routines by not asking farmers to sign several documents and pursue different processes. This would be mostly appreciated by farmers particularly those who are illiterate.
   - Facilitating and encouraging farmers, particularly the smaller ones, to join the village cooperative. Some farmers, however, were found to like very much joining the cooperative but they have some problems to do so,(see Chapter 8), while others do not like cooperative work. Solutions for both problems have been discussed in Chapter 8.
   - Not imposing any conditions on rain-fed farmers, i.e. they should be freed from the agricultural plan. This is particularly for those who have harsh conditions, and this will help them to get loans in kind.

10.4.2 Stimulating, encouraging and helping farmers to obtain information

Based on the findings of this survey, this can be done by the following:

1. Restoring Extension credibility to stimulate farmers communication behaviour

   Evidence from this study indicated that the credibility of extension workers in particular and the organization in general is very low among farmers, particularly those who have low scores in relation to the communicational factors. Therefore, unless the credibility of extension workers can be restored, farmers might not change their communication behaviour. They might boycott every source of knowledge about

innovations come from the Extension work. Based on farmers' comments in that respect, it is more likely that a part of restoring the credibility of extension worker can be done by the following:

- Freeing the Extension worker from work which is not related to Extension work such as carrying out and monitoring agricultural planning, taking tractors serial numbers or counting them, carrying out tax collection and so on.
- Training Extension workers regularly on how to communicate and apply research findings. By improving their link with research station would make them look knowledgeable in farmers' eye. Many farmers believe that extension workers have nothing to give farmers at the present time.

2. Concentrating on the most difficult targets

Also, based on the findings of this study that Extension workers' strategy (particularly in face to face contact) in diffusing innovations is likely to be built on hitting the easy target of the farming community, i.e. to involve progressive farmers, more efficient, risk taker, literate, better off and so on, in the assumption that innovations would trickle down among other farmers. Even if it is true, and there is little evidence from the survey it is more likely that the easily targeted farmers would see the advantages of the innovations and adopt without Extension input. To help more of the farmers, the following should be done.

- Face to face communication, such as extension worker visits to farmers and field demonstration, should be directed at the most difficult target. This action does not only help farmers to acquire knowledge about innovations and consequently reduce the tension of risk, but also it might help them to change their attitude towards their "Self's" because this time they are the target. Extension workers are directing their efforts towards them, then, they might feel that they are more important people.

- The mass media and general meetings with Extension through field day, for example, should be sufficient for any easy target of farmers to acquire knowledge about innovations as has been indicated by some of their comments.

3. Improving the efficiency of the existing channels or sources of information

   This can be done by the following.

   - Making farmers aware of all the existing sources or channels that can be used for obtaining knowledge about innovations. It is not acceptable at all that some farmers are not aware even about the existence of an Extension Organization in the country, yet it has been established for a very long time ago. Mass media can play a big role in this respect.
   - Improving the quality and the accessibility of the mass media (television, radio and publications).
   - Making use of combining more than one channel, such as "television group discussion or radio forum".
   - Pre-testing the message of the mass media before its incorporating in any programme to be broadcasted or transmitted to farmers.
   - Making use of feed back information which is necessary for the success of both farmers and extension workers as well as to the medium which they used.
   - Concentrating on short and simple messages by radio or television programme and repeating that message several times a day.
   - Repeating the message in different channels. Using different type of channels is very crucial for "rain fed farmers" particularly under the Syrian conditions where agricultural extension programmes are very general and there are no special programme devoted for "rain fed farming" only. Repeating the message in different channels and announcing programmes in advance would be of great benefits for farmers.

- Concentrating on field demonstration or Extension plot. This is very important method for reducing farmers' risk about innovations as well as the risk about borrowing others money if the cash is not available.
- Take full consideration of the indigenous knowledge of farmers, research however, could help in this subject in examining the validity of that very valuable knowledge.
- Local extension agent and leadership might be an important considerations for disseminating innovations among farmers, (see Chapter 4).

10.4.3 Solving farmers' machinery and equipment problems

Evidence from this survey indicated that the majority of the farmers, 68%, have neither equipment nor any type of machinery on their farms. Lack of machinery and equipment might be an explanatory factor for the level of adoption of innovations. Therefore, machinery and equipment should be made available to every farmer at the time they are required. Farmers who lack machinery and equipment also lack money, have small farm size which cannot justify ownerships of machinery and they have bad road conditions. All these aspects together affect partly the acceptance of innovations which require machinery and equipment. Solution to this could be done through three procedures:

1. By creating "machinery and equipment units" at the village level. These units would be a Government organization for letting machinery and equipment to farmers. The accessibility of these machinery and equipment should be restricted to those farmers who lack them in the first place. The service for each unit should depend on the amount of machinery and equipment available in each unit. It is recommended not to widen the area to be served by each unit. Also, any unit should be situated at the centre of the area devoted for that unit in order to treat farmers equally in terms of geographical distances and save long journey for that machinery. Farmers, however, should be encouraged to book machinery that they need in advance in order to get machinery

at the time they need them. Payment for the service should not be asked for at the year where little or no yield. If some farmers like to pay for the service just after finishing them, their payment should be accepted individually or collectively. Also, if other farmers would like to postpone the payment until the harvest time then they should be helped in that respect too.

2. By re-establishing and providing the service through the village cooperative

   As been mentioned in the previous chapters that some successful cooperatives bought some tractors with their profits in order to serve their members. Unfortunately, most of these cooperatives have failed in that respect due to the bad management of the machinery. This service might work again if the followings are considered.

   - Farmers should be encouraged to elect the supervision committee for the machinery every year and not restrict this supervision to the head of the cooperative and his deputy and other leading members.
   - Not a lot of farmers should be involved in supervising and managing the service; president, deputy, inspector and driver would be enough.
   - The priority of service should be given to the members who lack these machines and equipment.
   - Framers should be encouraged to make booking for the machinery and their turn must be respected.

3. By encouraging a groups of farmers to participate and buy their own machinery and equipment.

   This can be done through encouraging groups of farmers who lack equipment and machinery to participate in buying their machinery and equipment from the Government. Government should help these farmers in credit and facilitate the availability of them. Again few

farmers managing and supervising these machinery is recommended as well as changing the supervision staff every year.

10.4.4 Avoiding conflict with farmers' self images

This survey has shown that the problem of promoting and speeding up the adoption behaviour of farmers is not merely a matter of solving their scoci-economic and communicational problems, self images of farmers should be considered as well.

Extension workers should bear in mind that the new idea which conflicts with the images of the farmers would have very little chance to be adopted. For example, if the farmer views an innovation as for progressive farmers while he consider himself as traditional then it is more likely for him to reject that innovation. Therefore, Extension workers should be aware of the Self-Concept of the farmers before taking any action, such as training the farmers, educating them, diffusing the innovation among them and so on.

Changing farmers' images is very difficult like changing farmers' attitude, therefore it is recommended to work with the existing images without conflicting with them, i.e. to present the new things to them in a way that shows consistency with their held images but not to raise conflict. In this case groups of different self images should be approached separately. For example, farmers who see themselves as traditional should be contacted and trained separately. Modifying and changing these images might follow later when there is possibility to modify or change them.

The four major factors which were discussed in detail and used to draw the final recommendations are likely to be the crucial ones among other factors to improve the present adoption behaviour of farmers as well as to predict the best adoption to take place for any released innovation in the future.

The priority in considering the above recommendations should immediately be given to farmers in Zone2 who desperately need to be assisted.

10.5 Limitations of the study

Chapter 4 highlighted some problems and difficulties raised during the survey. Although the survey covered a great area of "rain fed farming", about

10.5 Limitations of the study

Chapter 4 highlighted some problems and difficulties raised during the survey. Although the survey covered a great area of "rain fed farming", about the half of the potential area for growing wheat, in northern and eastern parts of the country, the findings of this research might not be generalized to other parts. However, even so, the study has raised some crucial issues which are rarely or never used in the past adoption research. For example, self-image and personality aspects seems to play an important role in the adoption behaviour of farmers. Therefore, in the future researchers, Extension workers and policy makers must recognize the importance of these factors, not just in this country but in another countries of the world as well.

10.6 Suggestions for future research

- Agricultural proverbs

  Very little is known about farmers indigenous technical knowledge. The ultimate objective of this research and farmers limited ability in remembering and reporting these knowledge were a limiting factor for investigating more about this knowledge. However it has been possible to collect and investigate some most interesting proverbs, (Chapter 9). Therefore, it is recommended to devote a special investigation to explore more about this indigenous knowledge which might be of great benefits for the diffusion of future innovations. They may be effective and they will not conflict with farmers' self-image. So, this knowledge should be investigated, tested and understood in order to be considered in the future diffusion of innovations. This is important because, the future released innovations might, this time, conflict with this knowledge and the outcome might lead to the rejection of the diffused innovations.

- Simple Correlation

  Some simple correlation in fact tells us nothing about causal relationships unless some background information or farmers comments were available. In order to over come this problem the future research could benefit from the following example. Let us consider television (x) and

the adoption behaviour of farmers (y). Suppose significant relationship exists between the two variables (x and y), assuming the only information about the two variables is this relationships. In this case it is not possible to tell whether (x) affected (y) to increase or (y) affected (x), i.e. it is not clear whether innovations has led farmers to buy television or because farmers watch television they adopted innovations. In order to make sure that (x) affected (y) and is not vis versa, farmers have to be split into three groups. Farmers who have no television and do not watch it (A), farmers who have television but do not watch it (B) and farmers who have television and watch it (C). If ANOVA test shows significant differences between the three groups A, B and C particularly between A and B on one side and C on the other, and there is no significant difference between A and B in terms of the adoption behaviour of farmers then it is more likely that television (x) affected adoption (y).

Also simple correlation might sometimes exaggerate the effect of some variables on the the others. Therefore avoiding this effect could be achieved through the application of multiple regression analysis.

- Self-Concept

  This study has shown that the inter-relationships among the three self images (Cognized, Other, and Ideal) for each describing word was high for some dimensions. The cause of this high inter-relationships was not clear. A special investigation could be worthwhile.

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APPENDIX A

The allocation of "Sten Scores" according to the time of adopting innovations by farmers

** Notice: Farmers who adopted and rejected were included in the following tables.*

Table A.1: Allocation of "Sten Score"

Sten cumulative percentages	Sten Score	Zone1 (40)	Zone2 (20)
2.3	9	1	-
6.7	8	3	1
15.9	7	6	3
30.8	6	12	6
50.0	5	20	10
69.2	4	28	14
84.1	3	34	17
93.3	2	37	19
97.7	1	39	20
100.0	0	40	0

Table A.2: Sten Scores for the adoption of Nitrogen and Phosphorous in Zone1

Nitrogen				Phosphorous			
First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score	First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score
Up to 1957	3	3	8	Up to 1957	2	2	8
1962	1	4	"	1962	1	3	"
1966	1	5	7	1966	1	4	7
1970	1	6	"	1972	4	8	6
1972	7	13	6	1974	1	9	"
1974	1	14	5	1975	2	11	"
1975	3	17	"	1977	6	17	5
1977	6	23	4	1979	2	19	"
1978	1	24	"	1980	3	22	4
1979	2	26	"	1981	1	23	"
1980	2	28	"	1982	3	26	"
1981	1	29	3	1983	4	30	3
1982	2	31	"	1984	3	33	"
1983	3	34	"	Not yet	7	40	0
1984	1	35	2				
Not yet	5	40	0				

Table A.3: Sten Scores for the adoption of Nitrogen and Phosphorous in Zone2

Nitrogen				Phosphorous			
First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score	First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score
Up to 1972	1	1	8	Up to 1977	1	1	8
1979	1	2	7	1982	3	4	7
1980	1	3	"	1983	1	5	"
1982	3	6	6	1985	1	6	"
1983	1	7	5	1986	2	8	6
1984	2	9	"	Not yet	12	20	0
1986	1	10	"				
Not yet	10	20	0				

Table A.4: Sten Score for the adoption of the recommended time of applying nitrogen and the adoption of improved varieties of wheat in Zon1

Recommended time of applying N				Improved varieties			
First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score	First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score
Up to 1977	2	2	8	Up to 1970	6	6	7
1978	1	3	"	1972	3	9	6
1979	2	5	7	1973	1	10	"
1980	1	6	"	1974	3	13	5
1981	1	7	6	1975	5	18	"
1982	4	11	"	1976	3	21	4
1983	1	12	"	1977	2	23	"
1984	3	15	5	1979	3	26	"
1985	4	19	"	1980	2	28	"
1986	1	20	"	1982	3	31	3
Not yet	20	40	0	1983	1	32	"
				1984	1	33	"
				1985	1	34	"
				1978	1	35	2
				Not yet	5	40	0

Table A.5: Sten Score for the adoption of the recommended time of applying nitrogen and the adoption of improved varieties of wheat in Zone2

Recommended time of applying N				Improved varieties			
First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score	First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score
Up to 1982	1	1	8	Up to 1970	3	3	7
1983	1	2	7	1972	1	4	6
1984	1	3	"	1974	1	5	"
1985	1	4	6	1975	1	6	"
Not yet	16	20	0	1977	2	8	5
				1982	1	9	"
				1984	1	10	"
				1986	1	11	4
				1987	1	12	"
				Not yet	8	20	3

Table A.6: Sten Scores for the adoption of Seed renewal method and Herbicides in Zone1

Seed renewal				Herbicides			
First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score	First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score
Up to 1972	1	1	9	Up to 1967	1	1	9
1973	1	2	8	1970	1	2	8
1974	1	3	"	1975	1	3	"
1975	2	5	7	1977	3	6	7
1976	2	7	6	1978	1	7	6
1977	3	10	"	1979	2	9	"
1978	1	11	"	1980	1	10	"
1979	1	12	6	1981	1	11	"
1980	4	16	5	1982	3	14	5
1982	1	17	"	1983	3	17	"
1983	3	20	"	1984	1	18	"
1985	3	23	4	1985	1	19	"
Not yet	17	40	0	Not yet	21	40	0

Table A.7: Sten Scores for the adoption of Seed renewal method and Herbicides in Zone2

Seed renewal				Herbicides			
First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score	First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score
Up to 1970	2	2	7	Up to 1980	2	2	7
1972	1	3	"	1985	1	3	"
1974	1	4	"	1986	1	4	6
1975	2	6	6	Not yet	16	20	0
1977	1	7	5				
1978	1	8	"				
1980	2	10	"				
1984	1	11	4				
1985	2	13	4				
Not yet	7	20	0				

Table A.8: Sten Scores for the adoption of Pesticides and Seed bed preparation in Zone1

Pesticides				Seed bed preparation			
First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score	First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score
Up to 1975	1	1	9	Up to 1960	2	2	8
1976	1	2	8	1962	1	3	"
1978	1	3	"	1964	1	4	"
1979	1	4	7	1965	1	5	7
1980	2	6	"	1966	1	6	"
1983	1	7	6	1968	2	8	6
1985	1	8	"	1970	3	11	"
Not yet	32	40	0	1971	2	13	"
				1973	1	14	5
				1974	1	15	"
				1975	4	19	"
				1977	1	20	"
				1978	7	27	4
				1979	3	30	3
				1980	5	35	2
				1981	1	36	2
				Not yet	4	40	0

Table A.9: Sten Scores for the adoption of Pesticides and Seed bed preparation in Zone2

Pesticides	Seed bed preparation			
	First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score
Until in 1987 None was found to be adopter	Up to 1968	2	2	7
	1969	1	3	"
	1970	3	6	6
	1972	1	7	5
	1973	1	8	"
	1975	3	11	4
	1976	3	14	"
	1977	1	15	3
	1979	1	16	"
	1982	3	19	2
	Not yet	1	20	0

Table A.10: Sten Score for the adoption of Sowing machine in both zones

Zone1				Zone2			
First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score	First Year of adoption	Total adopter	Cumulative number of adopters	Sten Score
Up to 1957	1	1	9	Up to 1950	1	1	8
1962	1	2	8	1957	1	2	7
1963	1	3	"	1965	1	3	"
1965	1	4	7	1966	1	4	6
1966	2	6	"	1967	1	5	"
1967	4	10	6	1969	1	6	"
1968	2	12	"	1970	1	7	5
1970	1	13	5	1971	1	8	"
1974	2	15	"	1976	2	10	"
1975	2	17	"	1982	1	11	4
1979	4	21	4	1983	1	12	"
1980	1	22	"	1984	2	14	"
1981	1	23	"	1985	1	15	3
1982	2	25	"	Not yet	5	40	0
1983	1	26	"				
1984	1	27	"				
1986	1	28	"				
Not yet	12	40	"				

Table A.11: First years of adoption of the Nitrogen (N), Phosphorous (P), Recommended Time of Nitrogen application (RTN), Improved varieties of wheat (Im), Seed Renewal (SR), Herbicides (He), Pesticides (Pe), Recommended Time of Seed Bed preparation (RTSB), and Sowing machine (Sow)

No.	N	P	RTN	Im	SR	He	Pe	RTSB	Sow
1	1957	1957	1986	1973	1976	1982	1978	1960	1981
2	1972	1984	1984	1975	1979	1977	1985	1970	1983
3	1977	1977	—	1975	1985	1982	1983	1960	1979
4	1972	1972	1977	1974	1977	1979	1979	1964	1979
5	1975	1975	—	1975	—	1985	—	1975	—
6	—	—	—	—	—	1983	—	—	—
7	1972	—	—	1975	—	1970	—	1970	—
8	1983	—	—	—	—	1983	—	—	—
9	1975	1975	1985	1980	1980	1984	—	1974	1982
10	1962	1962	—	1982	—	1982	—	1965	1984
11	—	—	—	1982	—	—	—	1982	1985
12	1983	1983	1983	1986	1980	1986	—	1970	—
13	1986	1986	—	—	1985	1985	—	1976	—
14	1980	1985	—	1975	1985	—	—	1972	—
15	1977	1977	—	—	—	—	—	1973	—
16	—	—	—	—	—	—	—	1979	—
17	1977	—	—	—	1978	1980	—	1976	1984
18	1982	1982	1985	1984	—	—	—	1975	1984
19	1982	1982	1984	1977	—	—	—	1986	1983
20	1982	—	—	1972	1972	—	—	1975	1982
21	1977	1984	—	1972	—	1980	—	—	—
22	1977	1977	—	1987	—	1981	—	1977	—
23	1977	1977	1982	—	—	1977	—	1978	—
24	1972	1972	1979	1970	1972	1975	1976	1968	1967
25	1978	1983	1983	—	—	1977	1980	1978	—
26	1970	1980	1980	1970	—	1978	—	1971	1982
27	—	—	—	1985	—	—	—	1978	—
28	1972	1977	1982	1974	—	1983	—	1970	—
29	1957	1957	1977	1976	1978	1967	—	1962	—
30	1957	1972	1985	1983	1983	1979	1975	1971	—
31	1981	1981	1985	1970	1983	—	—	1978	1968
32	1982	1982	1984	1984	1985	—	—	1979	1957
33	1972	1972	—	1979	—	—	—	1973	1967
34	—	—	—	1982	1977	—	—	1980	1970
35	1980	1980	1984	1970	1985	—	—	1980	1986
36	1966	1966	1981	1970	1975	—	1980	1966	1966
37	1979	1979	1985	1979	1980	—	—	1980	1979
38	1977	1977	1978	1977	1977	—	—	1979	1979
39	1979	1979	—	1970	—	—	—	1981	1967
40	1983	1983	—	1980	1983	—	—	1978	1962

No.	N	P	RTN	Im	SR	He	Pe	RTSB	Sow
41	—	—	—	1982	1982	—	—	—	1968
42	1982	1982	1982	1972	1980	—	—	1980	1963
43	1983	1983	—	1972	—	—	—	1975	1967
44	—	—	—	1977	—	—	—	1979	1965
45	1974	1974	—	1975	1973	—	—	1975	1975
46	1984	1984	—	1974	1974	—	—	1978	1974
47	1979	1979	1979	1979	1980	—	—	1980	1974
48	1975	1983	—	1976	1975	—	—	1975	1980
49	1980	1980	—	—	—	—	—	1978	1975
50	1972	1982	1982	1976	1976	—	—	1968	1966
51	—	—	—	1987	1984	—	—	1982	1967
52	—	—	—	1974	1970	—	—	1969	1950
53	—	—	—	—	1980	—	—	1975	1969
54	—	1986	—	—	—	—	—	1970	1965
55	1972	1982	1982	1977	1977	—	—	1968	1966
56	—	—	—	1970	1974	—	—	1976	1976
57	—	—	—	—	1970	—	—	1970	1970
58	1983	—	—	—	1975	1980	—	1977	1957
59	—	—	—	1970	—	—	—	—	1976
60	—	—	—	1970	1975	—	—	1982	1971

—: Farmers who do not try the innovation or the improved practices

Note: the dates been issued include as well farmers who reject the innovation or improved practice after they tried it.

Table A.12: Farmers scores for the nine selected practices and innovations obtained by "Sten Score" method

No.	N	P	RTN	Im	SR	He	Pe	RTSB	Sow
1	8	8	5	6	6	5	8	8	4
2	5	3	5	5	6	7	6	6	4
3	4	5	0	5	4	5	6	8	4
4	5	6	8	5	6	6	7	7	4
5	5	6	0	5	0	5	0	5	0
6	0	0	0	0	0	5	0	0	0
7	5	0	0	5	0	8	0	6	0
8	3	0	0	0	0	5	0	0	0
9	5	6	5	4	5	5	0	5	4
10	7	8	0	3	0	5	0	7	4
11	0	0	0	5	0	0	0	2	3
12	6	6	7	4	5	6	0	6	0
13	6	6	0	0	4	7	0	4	0
14	7	6	0	6	4	0	0	5	0
15	7	8	0	0	0	0	0	5	0
16	0	0	0	0	0	0	0	3	0
17	7	0	0	0	5	7	0	4	4
18	6	7	6	5	0	0	0	4	4
19	6	7	7	5	0	0	0	7	4
20	6	0	0	6	7	0	0	4	4
21	4	3	0	6	0	6	0	0	0
22	4	5	0	2	0	6	0	5	0
23	4	5	6	0	0	7	0	4	0
24	5	6	7	7	9	8	8	6	6
25	4	3	6	0	0	7	7	4	0
26	7	4	7	7	0	6	0	5	4
27	0	0	0	3	0	0	0	4	0
28	5	5	6	5	0	5	0	6	0
29	8	8	8	4	6	9	0	8	0
30	8	6	5	3	5	6	9	5	0
31	3	4	5	7	5	0	0	4	6
32	3	4	5	3	4	0	0	3	9
33	5	6	0	4	0	0	0	5	6
34	0	0	0	3	6	0	0	2	5
35	4	4	5	7	4	0	0	2	4
36	7	7	6	7	7	0	7	7	7
37	4	5	5	4	5	0	0	2	4
38	4	5	8	4	6	0	0	3	4
39	4	5	0	7	0	0	0	2	6
40	3	3	0	4	5	0	0	4	8

No.	N	P	RTN	Im	SR	He	Pe	RTSB	Sow
41	0	0	0	3	5	0	0	0	6
42	3	4	6	6	5	0	0	2	8
43	3	3	0	6	0	0	0	5	6
44	0	0	0	4	0	0	0	3	7
45	5	6	0	5	8	0	0	5	5
46	2	3	0	5	8	0	0	4	5
47	4	5	7	4	5	0	0	2	5
48	5	3	0	4	7	0	0	5	4
49	4	4	0	0	0	0	0	4	5
50	5	4	6	4	6	0	0	6	7
51	0	0	0	4	4	0	0	2	6
52	0	0	0	6	7	0	0	7	8
53	0	0	0	0	5	0	0	4	6
54	0	6	0	0	0	0	0	6	7
55	8	7	8	5	5	0	0	7	6
56	0	0	0	7	6	0	0	4	5
57	0	0	0	0	7	0	0	6	5
58	5	0	0	0	6	7	0	3	7
59	0	0	0	7	0	0	0	0	5
60	0	0	0	7	6	0	0	2	5

Table A.13: Farmers scores for the nine selected practices and innovations obtained by "Sten Score" method after been modified

No.	N	P	RTN	Im	SR	He	Pe	RTSB	Sow
1	8	8	5	6	6	5	8	8	4
2	5	3	5	5	6	7	6	6	4
3	4	5	0	5	1	5	6	8	4
4	5	6	8	5	6	6	7	7	4
5	5	6	0	5	0	5	0	3	0
6	0	0	0	0	0	5	0	0	0
7	5	0	0	2	0	8	0	3	0
8	3	0	0	0	0	5	0	0	0
9	5	6	5	4	5	2	0	2	1
10	7	8	0	1	0	5	0	4	4
11	0	0	0	3	0	0	0	1	2
12	3	2	4	4	5	6	0	6	0
13	2	2	0	0	2	7	0	4	0
14	4	1	0	2	1	0	0	5	0
15	4	4	0	0	0	0	0	5	0
16	0	0	0	0	0	0	0	2	0
17	4	0	0	0	5	7	0	4	4
18	6	7	6	5	0	0	0	4	4
19	6	7	7	5	0	0	0	7	4
20	2	0	0	6	7	0	0	4	2
21	2	2	0	6	0	6	0	0	0
22	4	5	0	2	0	6	0	5	0
23	4	5	6	0	0	7	0	4	0
24	5	6	7	7	9	8	8	6	6
25	4	3	6	0	0	7	7	4	0
26	7	4	7	7	0	6	0	5	4
27	0	0	0	2	0	0	0	4	0
28	5	5	6	3	0	5	0	6	0
29	8	8	8	4	6	9	0	8	0
30	8	6	5	3	5	6	9	5	0
31	3	4	5	7	5	0	0	4	6
32	3	4	5	3	4	0	0	3	5
33	5	6	0	2	0	0	0	2	6
34	0	0	0	2	6	0	0	1	2
35	4	4	5	7	4	0	0	1	4
36	7	7	6	7	7	0	7	7	7
37	4	5	5	4	5	0	0	2	4
38	4	5	8	4	6	0	0	2	4
39	4	5	0	7	0	0	0	1	6
40	3	3	0	4	5	0	0	4	8

No.	N	P	RTN	Im	SR	He	Pe	RTSB	Sow
41	0	0	0	3	5	0	0	0	6
42	2	2	6	6	5	0	0	1	8
43	2	2	0	6	0	0	0	5	5
44	0	0	0	4	0	0	0	3	7
45	5	6	0	5	8	0	0	5	5
46	2	3	0	5	8	0	0	4	5
47	4	5	7	1	5	0	0	2	5
48	5	3	0	4	7	0	0	3	4
49	2	2	0	0	0	0	0	2	5
50	5	4	6	4	6	0	0	6	7
51	0	0	0	4	4	0	0	1	6
52	0	0	0	3	7	0	0	4	8
53	0	0	0	0	3	0	0	4	6
54	0	5	0	0	0	0	0	3	7
55	8	7	8	5	5	0	0	7	6
56	0	0	0	7	6	0	0	2	5
57	0	0	0	0	7	0	0	3	5
58	2	0	0	0	6	2	0	2	7
59	0	0	0	7	0	0	0	0	5
60	0	0	0	7	6	0	0	1	5

APPENDIX B

Extension recommendations on growing rain-fed wheat

B.1 Seed Bed Preparation

- Removing the residue of the previous crops
- Two crossed cultivations to a depth of 25 to 30 cm.
- Rolling the soil surface
- Tine cultivation
- Sowing seeds by sowing machine

B.2 D

ate Of Planting

The earlist time to start planting is mid October and the latest is mid December.

B.3 Fertilization

B.3.1 First stability Zone (from 350mm and above)

B.3.1.1 Improved varieties of wheat

The recommended amount of pure nitrogen is 10 units per Donnom (1000 m^2 These units are equivalent to 22 kg Urea 46% , 30 kg Ammonium Nitrate 33.5%, or 34 kg Amonium Nitrate 30% as a compound fertilizer.

Half of the recommended amount of nitrogen should be applied at the planting time and the other half at the time of tillering.

The recommended amount of P2O5 is 8 units which is equivalent to 17 kg of Triple Super Phosphate 46% as a compound fertilizer. All of the amount should be applied at planting time.

B.3.1.2 Local varieties

The recommended amount of pure nitrogen is 6 units per Donnom. These units are equivalent to 14 kg of Urea 46%, 18 kg of Ammonium Nitrate 33.5 or 20 kg of Ammonium Nitrate as a compound fertilizer. Again, half the amount should be applied at planting time and the other half at the time of tillering.

The recommended amount of P2O5 is also 6 units which is equivalent to 14 kg of Triple Super Phosphate of 46% as a compound fertilizer.

B.3.2 Second Stability Zone (250- 350mm)

B.3.2.1 Improved varieties of wheat

The recommended amount of nitrogen and phosphorus and the time of their application is exactly similar to what was reported in section (B.3.1.2).

B.3.2.2 Local varieties

The recommended amount of pure nitrogen is 4 units which is equivalent to 9 kg of Urea 46%, 12 kg of Ammonium Nitrate 33.5% or 14 kg of Ammonium Nitrate 30%as a compound fertilizer. Half of this amount should be applied at planting time and the other half at the time of tillering.

The recommended amount of P2O5 is also 4 units which is equivalent to 9 kg of Triple Super Phosphate 46%. All of this amount should be applied at the planting time.

However,the summary of this section (section 3) is displayed in the following table.

Table B.1: The Recommended Amounts (Units) Of Chemical Fertilizer For The Wheat Crop In First And Second Stability Zone Per Donnom

Type of wheat	Zone1			Zone2		
	Total amount of N	N at planting time	Total amount of P	Total amount of N	N at planting time	Total amount of P
Improved variety	10	5	8	6	3	6
Local variety 6	3	6	4	2	4	

B.4 Amount Of Seed

The recommended amount of seed per Donnom is equal to 10-14 kg in the first stability zone or 10-12 kg in the second stability zone regardless which variety is used.

B.5 Type of Varieties

The recommended type of wheat varieties are all improved varieties such as "Bohoth 1", "Sham 2", "Sham 4", "Jazerah17", "Jori 69" "Maxiback", "Citycerose", "Iksad 65".

B.6 Pest Control

B.6.1 Rodents

The process of controlling rodents should start in October and last until March each year. The recommended dose of pesticide is a teaspoon full of a pesticide. This dose should be put at the mouth of the hole to a depth of 7 to 8cm.

B.6.2 Wire Worm

The recommended pesticides are "Decis" and "Trichlorfon". The control should take place when the level of worm infestation reach 1 to 3 worm in a metre square.

B.6.3 "Coccinella"

The recommended pesticides are "Dicis 2.5 " and "Pirimipphos-M". The process of controlling Coccinella should start when the level of infestation by this insect reach 1 individual in each metre square.

B.7 Weed Control

B.7.1 Oat

The recommended herbicides are "Illoxan 36 EC, and "Avenge 250", where the first is recommended at early stages of growth and Afing at the maturity stages. Herbicide application should start when the level of oat infestation reach 15 plants in each square metre.

B.7.2 Broad Leaved Weeds

The recommended herbicides are "U46 Combi Fluid", "Dicopur Combi" and "2,4,D".

Application should start when the level of infestation by weeds reach 4 to 6 plants in metre square.

APPENDIX C

The relationships among the studied factors

Table C.1: The inter-relationships among the related variables of the Personal and Socio-Economic factors in Zone1

Variable	Relation				
Fragmentation	1.0000				
Family size	0.3927	1.0000			
Family type	0.2812	0.5606	1.0000		
Literacy	0.1177	0.1951	0.2354	1.0000	
Family Education	0.3408	0.3114	-0.0748	0.0639	1.0000

Table C.2: The inter-relationships among the related variables of the Personal and Socio-Economic factors in Zone2

Variable	Relation		
Family size	1.0000		
Farm size	0.7851	1.0000	
Labour	0.4371	0.5607	1.0000

Table C.3: The inter-relationships among the related variables of the Institutional and Economic factors in Zone1

Variable	Relation					
Machinery and equip.	1.0000					
Road condition	0.3218	1.0000				
Credit and cash	0.4675	0.2579	1.0000			
Cash crop	0.1153	-0.0086	0.3053	1.0000		
Perception of the accessibility of innovations	0.6394	0.3569	0.3234	0.1026	1.0000	
Perception of the cost of innovation	0.6864	0.4340	0.5007	0.2950	0.5895	1.0000

Table C.4: The inter-relationships among the related variables of the Personal and Socio-Economic factors in Zone2

Variable	Relation		
Machinery and equipments	1.0000		
Perception of the accessibility of the innovation	0.3164	1.0000	
Perception of the cost of the innovation	0.4175	0.1447	1.0000

Table C.5: The inter-relationships among the related variables of the Communicational factors in Zone1

Variables	Relations					
-Total sources of information		1.0000				
-Farmers visits to Extension	0.3709	1.0000				
-Extension agent visits to farmer	0.5684	0.2803	1.0000			
-Farmer visit to the cooperative	0.5516	0.3413	0.3126	1.0000		
-Farmers attendance to coop. meeting	0.5938	0.4100	0.3623	0.9327	1.0000	
-Involvement in Extension plot	0.5650	0.4226	0.3714	0.2682	0.3555	1.0000
-Watching Tv prog.	0.3369	0.4016	0.0801	0.2271	0.2477	0.2814
-Watching Tv adv.	0.4997	0.4005	0.2842	0.1190	0.2021	0.5003
-Listening to radio programme	0.5323	0.3935	0.2832	0.5841	0.6545	0.3884
-Reading Extension publication	0.4470	0.3241	0.7925	0.2483	0.2920	0.2394
-Involvement in training course	0.3311	0.1756	0.4769	0.1657	0.1990	0.3476
-All communicational factors	0.6810	0.6612	0.5218	0.6972	0.7589	0.5994

Table C.6: Continue Table 5

Variables	Relations					
-Watching Tv prog.	1.0000					
-Watching Tv adv.	0.6765	1.0000				
-Listening to radio programme	0.2570	0.2996	1.0000			
-Reading Extension publication	0.1246	0.2556	0.2411	1.0000		
-Involvement in training course	0.1743	0.2808	0.2220	0.0359	1.0000	
-All communicational factors	0.6111	0.6153	0.7205	0.4669	0.3734	1.0000

Table C.7: The inter-relationships among the related variables of the Psychological factors in Zone1

Variables	Relation					
-Money brings happiness	1.0000					
-Family burden	0.0632	1.0000				
-Fortunate	0.2139	-0.2038	1.0000			
-Proverbs	0.0411	0.1361	0.2153	1.0000		
-Attitude towards rain-fed farming (directly)	0.2727	0.1741	0.1107	0.1261	1.0000	
-Attitude towards rain-fed farming (indirectly)	0.1903	0.2931	0.0186	0.1780	0.8515	1.0000
-Innovation is risky	-0.3420	0.0864	-0.3506	-0.1351	-0.2598	0.1559
-View of being the first to adopt	0.1704	0.2386	0.1850	0.1332	0.2476	0.2238
-Speed of adoption	0.3958	0.2218	0.3644	0.1916	0.0902	0.0581
-Innovation is easier	0.3815	0.3954	0.1941	0.0178	0.1561	0.0507
-Innovation is time savers	0.2583	0.1276	0.1879	0.2952	0.3814	0.3620
-Innovation is compatible	0.2883	0.2171	0.2270	0.2212	0.0740	0.1536
-Defeat in arguments	0.1636	0.1674	0.1769	0.1277	0.1303	0.0610
-Reaction to news	0.4669	0.1572	-0.0635	0.1766	0.0936	0.0675
-Willing to change	0.1775	0.4134	-0.0645	0.3402	0.2144	0.1926
-Not satisfy with your progress in farming	0.1323	-0.3536	0.2180	0.2383	0.0600	0.0267
-Desire to be well off	0.6973	0.1476	-0.0000	-0.0690	0.3182	0.2206

Table C.8: Continue Table 6

Variables	Relation					
-Innovation is risky	1.0000					
-View of being the first to adopt	-0.3957	1.0000				
-Speed of adoption	-0.7282	0.5351	1.0000			
-Innovation is easier	-0.0436	0.1932	0.1993	1.0000		
-Innovation is time savers	-0.02553	0.0579	0.0311	0.5874	1.0000	
-Innovation is compatible	-0.3454	0.3695	0.4845	0.2790	0.2335	1.0000
-Defeat in arguments	-0.0775	0.0246	0.2360	0.2375	-0.04116	0.1449
-Reaction to news	-0.2955	0.1184	0.1694	0.0062	0.0497	0.1864
-Willing to change	-0.1567	0.3242	0.2780	0.2088	0.2830	0.2302
-Not satisfy with your progress in farming	0.1638	0.1309	0.2260	0.1551	0.3023	0.1202
-Desire to be well off	-0.4786	0.2011	0.4200	0.3280	0.3705	0.2467

Table C.9: Continue Table 6

Variables	Relation				
-Defeat in arguments	1.0000				
-Reaction to news	-0.1251	1.0000			
-Willing to change	0.1428	0.2666	1.0000		
-Not satisfy with your progress in farming	0.3155	0.2266	0.7036	1.0000	
-Desire to be well off	0.1869	0.4027	0.3273	0.3948	1.0000

Table C.10: The inter-relationships among the related variables of the Psychological factors in Zone2

Variable	Relation						
-Money brings happiness	1.0000						
-Attitude towards rain-fed farming	0.1110	1.0000					
-Innovation is risky	0.4620	0.1869	1.0000				
-Speed of adoption	0.6432	0.3623	0.3404	1.0000			
-Innovation is time savers	0.3941	0.1169	0.2085	0.2129	1.0000		
-Innovation is compatible	0.3232	0.2384	0.5130	0.3741	0.1070	1.0000	
-Desire to be well off	0.8307	0.2536	0.3297	0.5771	0.2750	0.2706	1.0000

Table C.11: The inter-relationships among the different dimensions of the Self-Concept (Cognized Self) in Zone1

Variable	Relation				
Progressive	1.0000				
Efficient	0.5160	1.0000			
Innovative	0.7661	0.5073	1.0000		
Proper	0.9037	0.6196	0.7228	1.0000	
Experienced	0.6100	0.5709	0.5778	0.7594	1.000

Table C.12: The inter-relationships among the different dimensions of the Self-Concept (Cognized Self) in Zone2

Variable	Relation				
Progressive	1.0000				
Efficient	0.3626	1.0000			
Innovative	0.6554	0.5149	1.0000		
Proper	0.5265	0.5579	0.7640	1.0000	
Experienced	0.5160	0.3423	0.3879	0.3560	1.000

Table C.13: The inter-relationships among the different dimensions of the Self-Concept (Other Self) in Zone1

Variable	Relation				
Progressive	1.0000				
Efficient	0.4923	1.0000			
Innovative	0.4951	0.4714	1.0000		
Proper	0.6940	0.5365	0.7171	1.0000	
Experienced	0.4998	0.6042	0.1964	0.5056	1.000

Table C.14: The inter-relationships among the different dimensions of the Self-Concept (Other Self) in Zone2

Variable	Relation				
Progressive	1.0000				
Efficient	0.3435	1.0000			
Innovative	0.4265	0.5325	1.0000		
Proper	0.6075	0.4655	0.6569	1.0000	
Experienced	0.6590	0.3682	0.2003	0.4920	1.000

Table C.15: The inter-relationships among the different dimensions of the Self-Concept (Ideal Self) in Zone1

Variable	Relation				
Progressive	1.0000				
Efficient	0.5827	1.0000			
Innovative	0.6992	0.3657	1.0000		
Proper	0.8783	0.5637	0.6883	1.0000	
Experienced	0.5334	0.6147	0.2886	0.6578	1.000

Table C.16: The inter-relationships among the different dimensions of the Self-Concept (Ideal Self) in Zone2

Variable	Relation				
Progressive	1.0000				
Efficient	0.5031	1.0000			
Innovative	0.5756	0.4757	1.0000		
Proper	0.7680	0.4145	0.5446	1.0000	
Experienced	0.3440	0.1760	0.4066	0.2835	1.000

Table C.17: The relationships between the related variables of the Personal and Socio-Economic factors and the related variables of the Economic and Institutional factors in Zone1

	Fragm-entation	Family size	Family type	Literacy	Family education
Machinery and equip.	0.5149	0.6407	0.3717	0.2069	0.4359
Road condition	0.1623	0.2770	0.0331	0.2162	0.2890
Credit and money	0.2417	0.2017	0.0749	0.4532	0.2488
Cash crop	0.1064	0.1515	0.0612	0.2347	0.0380
Perception of the accessibility of inn.	0.4719	0.2464	0.1857	0.0594	0.2351
Perception of the cost of innovation	0.4937	0.6159	0.3294	0.4083	0.3943

Table C.18: The relationships between the related variables of the Personal and Socio-Economic factors and the related variables of the economic and Institutional factors in Zone2

	Farm size	Labour	Family size
Machinery and equip.	0.7526	0.6333	0.8843
Credit and money	0.4074	0.5794	0.4230
Perception of the cost of innovation	0.6563	0.3066	0.4453

Table C.19: The relationships between the related variables of the Personal and Socio-Economic factors and the related variables of the Communicational factors in Zone1

	Fragm-entation	Family size	Family type	Literacy	Family education
-Total sources of information	0.4879	0.3254	0.1502	0.3744	0.4293
-Farmers visits to Extension	0.3409	0.2097	0.1682	0.1678	0.3154
-Extension agent visits to farmer	0.3340	0.1734	0.1187	0.3936	0.3554
-Farmer visit to the cooperative	0.2699	-0.1400	-0.1430	-0.0358	0.1993
-Farmers attendance to coop. meeting	0.2846	-0.0458	-0.0959	0.0333	0.2437
-Involvement in Extension plot	0.5795	0.3462	0.2262	0.3902	0.3823
-Watching Tv prog.	0.2958	0.3386	0.1041	0.1562	0.2521
-Watching Tv adv.	0.3798	0.3972	0.1255	0.3822	0.3298
-Listening to radio programme	0.4396	-0.0047	0.0210	0.2209	0.4053
-Reading Extension publication	0.1985	0.2014	0.2618	0.3419	0.4185
-Involvement in training course	0.3719	0..2453	0.1346	0.2576	0.0258
-All communicational factors	0.5142	0.2299	0.1603	0.2809	0.4126

Table C.20: The relationships between the related variables of the Personal and Socio-Economic factors and the related variables of the Psychological factors in Zone1

	Fragm-entation	Family size	Family type	Literacy	Family education
-Money brings happiness	0.2864	0.2197	0.2853	-0.1013	0.1636
-Family burden	0.1117	0.1973	-0.0096	0.3218	0.3963
-Fortunate	0.2272	0.2705	0.2639	-0.1005	-0.0182
-Proverbs	0.0504	0.2271	-0.2333	0.0470	0.4547
-Attitude towards rain-fed farming (directly)	0.1753	0.0964	0.0285	0.2025	0.0462
-Attitude towards rain-fed farming (indirectly)	0.0136	0.1184	0.0381	0.1462	0.1726
-Innovation is risky	0.4521	0.3210	0.2446	0.2033	0.2619
-View of being the first to adopt	0.3332	0.2623	0.2293	0.2843	0.0936
-Speed of adoption	0.4511	0.3234	0.2219	0.2897	0.3338
-Innovation is easier	0.2901	0.2105	0.2326	0.2015	0.3699
-Innovation is time savers	-0.0000	0.2088	-0.0103	-0.0315	0.4035
-Innovation is compatible	0.4939	0.6483	0.3669	0.2835	0.5033
-Defeat in arguments	0.3342	0.2743	0.1941	0.3423	0.1646
-Reaction to news	0.1566	0.2718	0.3489	0.0543	0.1759
-Willing to change	0.2738	0.1746	-0.0213	0.3892	0.3515
-Not satisfy with your progress in farming	0.1610	0.1656	-0.1572	0.3224	0.4042
-Desire to be well off	0.3329	0.3373	0.3067	-0.0000	0.2761

Table C.21: The relationships between the related variables of the Personal and Socio-Economic factors and the related variables of the Psychological factors in Zone2

	Farm size	Labour	Family size
-Money brings happiness	0.2833	0.5931	0.1730
-Attitude towards rain-fed farming (indirectly)	0.1786	0.2504	0.1943
-Innovation is risky	0.2861	0.1883	0.5251
-Speed of adoption	0.3935	0.6867	0.2087
-Innovation is time savers	0.1016	0.2749	0.1657
-Innovation is compatible	0.8422	0.6376	0.9030
-Desire to be well off	0.1572	0.4470	0.0934

Table C.22: The relationships between the related variables of the Economic and Institutional factors and the related variables of the Communicational factors in Zone1

	Machinery and equipment	Road condition	Credit and money	Cash crop	Perception of the access of of inno.	Percetion of the cost inno.
-Total sources of information	0.3917	0.3647	0.2632	0.1876	0.2810	0.5923
-Farmers visits to Extension	0.4037	0.2654	0.2381	0.0459	0.2089	0.4428
-Extension agent visits to farmer	0.3894	0.3348	0.2717	0.1397	0.4147	0.4856
-Farmer visit to the cooperative	0.1471	0.1535	0.2805	0.2258	0.3353	0.3091
-Farmers attendance to coop. meeting	0.1776	0.1741	0.2852	0.2401	0.3106	0.3681
-Involvement in Extension plot	0.3975	0.2883	0.3141	0.1335	0.1775	0.4832
-Watching Tv prog.	0.3616	0.1013	0.0847	0.2340	0.1373	0.3063
-Watching Tv adv.	0.3624	0.0364	0.2865	0.4301	0.0259	0.4749
-Listening to radio programme	0.2563	-0.0305	0.3907	0.0891	0.2978	0.3401
-Reading Extension publication	0.2992	0.1843	0.1671	0.1131	0.3700	0.4901
-Involvement in training course	0.5736	0.1498	0.3609	0.1534	0.4104	0.3980
-All communicational factors	0.4740	0.1741	0.3878	0.2824	0.3652	0.5748

Table C.23: The relationships between the related variables of the Economic and Institutional factors and the related variables of the Psychological factors in Zone1

	Machinery and equipment	Road condition	Credit and money	Cash crop	Perception of the access of inno.	Percetion of the cost of inno.
-Money brings happiness	0.3459	0.3287	0.0441	0.2689	0.2755	0.2668
-Family burden	0.1383	0.3591	0.3175	0.1220	0.0772	0.3334
-Fortunate	0.2969	0.1721	0.1179	-0.2395	0.2549	0.3620
-Proverbs	0.2450	0.3056	0.2409	-0.1142	-0.0139	0.3394
-Attitude towards rain-fed farming (directly)	0.0275	0.1747	0.1025	0.2532	-0.1283	0.3121
-Attitude towards rain-fed farming (indirectly)	0.0325	0.1444	0.1022	0.3103	-0.0464	0.3450
-Innovation is risky	-0.2811	-0.1354	-0.3090	-0.2503	-0.0605	-0.3905
-View of being the first to adopt	0.2295	0.2389	0.3051	0.2010	0.2167	0.4422
-Speed of adoption	0.4713	0.3564	0.3604	0.1329	0.3054	0.4683
-Innovation is easier	0.3277	0.5289	0.2040	-0.0736	0.2256	0.3453
-Innovation is time savers	0.2231	0.3144	0.0461	0.1312	0.0128	0.2436
-Innovation is compatible	0.8720	0.3675	0.4100	0.1689	0.6296	0.7316
-Defeat in arguments	0.2206	0.3363	0.1030	-0.1139	0.1642	0.2524
-Reaction to news	0.2926	0.0957	0.114	0.2986	0.0790	0.2156
-Willing to change	0.2385	0.1296	0.4376	0.3478	0.1185	0.3767
-Not satisfy with your progress in farming	0.1816	0.1742	0.2396	0.4158	0.1194	0.2463
-Desire to be well off	0.2230	0.2182	0.0747	0.4554	0.0862	0.2283

Table C.24: The relationships between the related variables of the Economic and Institutional factors and the related variables of the Psychological factors in Zone2

	Machinery and equipment	Credit and money	Perception of the cost of innovation
-Money brings happiness	0.2833	0.2492	0.5157
-Attitude towards rain-fed farming (indirectly)	0.1479	0.1741	0.1498
-Innovation is risky	-0.4396	-0.2353	-0.1005
-Speed of adoption	0.2885	0.5970	0.0616
-Innovation is time savers	0.1375	0.3826	0.3143
-Innovation is compatible	0.9471	0.3910	0.4640
-Desire to be well off	0.2391	0.3164	0.0000

Table C.25: The relationships between the related variables of the Communicational factors and the related variables of the Psychological factors in Zone1

	Total source of info.	Farmer visit to Extension	Extension agent visit to farmer	Farmer visit to the coop.	Farmer attendence to the coop.	Involvement in Extension plot
-Money brings happiness	0.2873	0.2220	0.3469	0.1451	0.1990	0.2129
-Family burden	0.2410	0.3547	0.2188	0.2022	0.1606	0.3607
-Fortunate	0.3699	0.2482	0.1582	-0.0751	0.0920	0.1927
-Proverbs	0.4086	0.1705	0.0596	-0.2197	-0.2602	0.2487
-Attitude towards rain-fed farming (directly)	0.1794	0.1529	0.1498	-0.0295	0.0171	0.2494
-Attitude towards rain-fed farming (indirectly)	0.1610	0.0791	0.0575	0.0287	-0.0261	0.2064
-Innovation is risky	-0.5502	-0.3469	-0.4001	-0.2657	-0.3423	-0.4789
-View of being the first to adopt	0.2642	0.0489	0.1119	0.1950	0.1138	0.3734
-Speed of adoption	0.5858	0.4501	0.3237	0.2319	0.2888	0.5592
-Innovation is easier	0.2563	0.3591	0.3096	0.1202	0.1214	0.3188
-Innovation is time savers	0.2777	0.1837	0.1363	0.1939	0.2419	0.0776
-Innovation is compatible	0.4007	0.2649	0.4451	0.1175	0.1396	0.3509
-Defeat in arguments	0.3898	0.2615	0.4498	-0.0307	0.0439	0.5883
-Reaction to news	0.3550	0.1591	0.1722	0.2164	0.1951	0.0726
-Willing to change	0.3817	0.3204	0.2809	0.4725	0.4749	0.3732
-Not satisfy with your progress in farming	0.3702	0.3781	0.3487	0.3840	0.4502	0.4262
-Desire to be well off	0.2998	0.2288	0.3009	0.1110	0.2487	0.3491

Table C.26: Continue Table 22

	Watch TV prog.	Watch TV adv.	Listen to radio prog.	Reading Ext. publication	Involvement in training course	All communicational factor
-Money brings happiness	0.2288	0.1162	0.1148	0.2425	0.3219	0.2986
-Family burden	0.3427	0.3691	0.1857	0.2861	0.0276	0.4571
-Fortunate	0.0942	0.1056	0.1772	0.1134	0.1898	0.1994
-Proverbs	0.0807	0.0972	0.2826	0.0962	-0.0712	0.1745
-Attitude towards rain-fed farming (directly)	0.2159	0.3088	0.0141	0.1088	0.1745	0.2117
-Attitude towards rain-fed farming (indirectly)	0.1809	0.2364	-0.0238	0.2114	0.0248	0.1759
-Innovation is risky	-0.4254	-0.4217	-0.3919	-0.3364	-0.2432	-0.5785
-View of being the first to adopt	0.3971	0.2793	0.2118	0.0899	0.1280	0.2979
-Speed of adoption	0.5289	0.4900	0.3593	0.2129	0.3491	0.5739
-Innovation is easier	0.05118	0.1367	0.2247	0.2200	0.2026	0.2936
-Innovation is time savers	0.2212	0.2382	0.1998	0.1183	0.0892	0.2642
-Innovation is compatible	0.3955	0.3974	0.2138	0.4535	0.4032	0.4393
-Defeat in arguments	-0.0229	0.2430	0.1348	0.2508	0.3401	0.2166
-Reaction to news	0.2827	0.0940	0.1419	0.1801	0.1236	0.2731
-Willing to change	0.3951	0.3546	0.3661	0.2440	0.1838	0.5079
-Not satisfy with your progress in farming	0.3974	0.4343	0.3466	0.2472	0.1744	0.4840
-Desire to be well off	0.3980	0.3571	0.1797	0.1917	0.2407	0.3882

Table C.27: The relationships between the Self-Concept (Cognized Self) and all of the related variables of the Personal and Socio-Economic, Economic and Institutional, Communicational and Psychological factors in Zone1

	Progressive	Efficient	Innovative	Proper	Experienced
-Fragmentation	0.5306	0.4669	0.5052	0.4460	0.4167
-Family size	0.3897	0.3187	0.4468	0.3743	0.3510
-Family type	0.1905	0.3499	0.3339	0.1844	0.1577
-Literacy	0.4062	0.3660	0.4702	0.5056	0.4298
-Family Education	0.3982	0.2922	0.3320	0.3450	0.2512
-Machinery and equip.	0.4418	0.3593	0.5455	0.4131	0.4182
-Road condition	0.2981	-0.1136	0.3587	0.2245	0.1083
-Credit and money	0.3744	0.4403	0.4739	0.4284	0.5710
-Cash crop	0.1383	0.2180	0.2801	0.2008	0.3464
-Perception of the accessibility of inn.	0.2237	0.2357	0.3713	0.1881	0.2719
-Perception of the cost of innovation	0.5615	0.4426	0.5219	0.5437	0.5709
-Total sources of information	0.5804	0.2122	0.6026	0.5454	0.4760
-Farmers visits to Extension	0.4169	0.1119	0.4129	0.4036	0.3065
-Extension agent visits to farmer	0.3654	0.2276	0.4045	0.3538	0.3085
-Farmer visit to the cooperative	0.2817	0.0109	0.2121	0.2938	0.4202
-Farmers attendance to coop. meeting	0.3398	0.0951	0.2400	0.3701	0.4535
-Involvement in Extension plot	0.5087	0.2486	0.5705	0.4310	0.3671
-Watching Tv prog.	0.5709	0.3554	0.5828	0.6054	0.3435
-Watching Tv adv.	0.6099	0.4907	0.6112	0.6614	0.4252
-Listening to radio programme	0.4502	0.4153	0.3719	0.5152	0.5172
-Reading Extension publication	0.3491	0.2992	0.3051	0.3381	0.2853
-Involvement in training course	0.2192	0.1854	0.4214	0.2122	0.2627
-All communicational factors	0.6536	0.4124	0.6466	0.6767	0.6171
-Money brings happiness	0.2823	0.1242	0.3405	0.1367	0.0538
-Family burden	0.3025	0.1690	0.3318	0.2604	0.2197
-Fortunate	0.2598	0.0792	0.3743	0.2236	0.1509
-Proverbs	0.1800	0.0364	0.2216	0.2241	0.3193

	Progressive	Efficient	Innovative	Proper	Experienced
-Attitude towards rain-fed farming (directly)	0.2557	0.3284	0.2543	0.2724	0.4179
-Attitude towards rain-fed farming (indirectly)	0.1938	0.2539	0.1999	0.1876	0.4034
-Innovation is risky	-0.7162	-0.4056	-0.7043	-0.6030	-0.4274
-View of being the first to adopt	0.5185	0.2749	0.6454	0.4433	0.3392
-Speed of adoption	0.7654	0.3445	0.8878	0.6297	0.3584
-Innovation is easier	0.2988	0.0717	0.3136	0.2531	0.1465
-Innovation is time savers	0.1446	0.0826	0.2291	0.2100	0.2993
-Innovation is compatible	0.5242	0.4398	0.5931	0.4713	0.4161
-Progressive**	0.5353	0.4481	0.5299	0.6479	0.6925
-Efficient**	0.4449	0.3790	0.5155	0.3525	0.2732
-Innovative**	0.7379	0.4509	0.9499	0.6769	0.5246
-Proper**	0.6684	04061	0.7407	0.6472	0.5400
-Experienced**	0.3677	0.3501	0.2212	0.2967	0.3071
-Defeat in arguments	0.1532	-0.0304	0.2898	0.1484	0.1447
-Reaction to news	0.1100	0.2129	0.2081	0.0710	0.0719
-Willing to change	0.2981	0.3066	0.4283	0.3248	0.4547
-Not satisfy with your progress in farming	0.1798	0.0871	0.3364	0.2437	0.2742
-Desire to be well off	0.3416	0.2676	0.4745	0.2362	0.1701

**Other Self

Table C.28: The relationships between the Self-Concept (Cognized Self) and all of the related variables of the Personal and Socio-Economic, Economic and Institutional, and Psychological factors in Zone2

	Progressive	Efficient	Innovative	Proper	Experienced
-Farm size	0.5454	0.3313	0.5513	0.4151	0.6574
-Family size	0.3322	0.1315	0.5999	0.4137	0.3865
-Labour	0.2967	0.2331	0.3244	0.3156	0.2111
-Machinery and eqiup.	0.2833	0.2226	0.4792	0.3834	0.2112
-Credit and money	0.2325	0.0159	0.4787	0.4392	0.2034
-Perception of the cost of innovation	0.1511	0.1968	0.1299	0.2372	0.3573
-Money brings happiness	0.4060	0.1559	0.2374	0.4524	0.3026
-Attitude towards rain-fed farming (indirectly)	0.1779	0.1352	0.0906	0.2110	0.4490
-Innovation is risky	-0.4774	-0.1875	-0.6281	-0.6270	-0.1601
-Speed of adoption	0.4701	0.2426	0.5102	0.5238	0.3504
-Innovation is time savers	0.0747	0.2581	0.2807	0.6061	0.1002
-Innovation is compatible	0.4041	0.2886	0.5800	0.4737	0.4107
-Progressive**	0.5554	0.3827	0.5940	0.5865	0.6122
-Efficient**	0.2472	0.8629	0.4955	0.4328	0.4298
-Innovative**	0.5766	0.6081	0.7304	0.7205	0.4415
-Proper**	0.4346	0.4605	0.7067	0.7289	0.40746
-Experienced**	0.3812	0.1527	0.3990	0.1678	0.3510
-Desire to be well off	0.2833	0.2226	0.1242	0.3834	0.2112

**Other Self

Table C.29: The relationships between the Self-Concept (Other Self) and all of the related variables of the Personal and Socio-Economic, Economic and Institutional, Communicational and Psychological factors in Zone1

	Progressive	Efficient	Innovative	Proper	Experienced
-Fragmentation	0.4600	0.5094	0.4504	0.5495	0.3431
-Family size	0.6104	0.2735	0.4288	0.5591	0.5309
-Family type	0.3508	0.1213	0.3506	0.2872	0.1488
-Literacy	0.4164	0.2640	0.4192	0.4097	0.0267
-Family Education	0.2604	0.2575	0.2442	0.3437	0.3902
-Machinery and equip.	0.5284	0.3882	0.4731	0.5493	0.3782
-Road condition	0.1954	0.4271	0.2702	0.3910	0.2512
-Credit and money	0.3937	0.3459	0.3847	0.5424	0.2738
-Cash crop	0.1787	0.1363	0.2094	0.1863	-0.0477
-Perception of the accessibility of inn.	0.1466	0.3751	0.2703	0.3365	0.1948
-Perception of the cost of innovation	0.6112	0.5034	0.5219	0.7391	0.4531
-Total sources of information	0.4301	0.3418	0.6026	0.5605	0.1569
-Farmers visits to Extension	0.3779	0.3557	0.4129	0.4866	0.2275
-Extension agent visits to farmer	0.2785	0.2841	0.4045	0.4093	0.1365
-Farmer visit to the cooperative	0.1615	0.1282	0.2121	0.2675	-0.0050
-Farmers attendance to coop. meeting	0.2270	0.1740	0.2400	0.3540	0.0879
-Involvement in Extension plot	0.3646	0.2652	0.5705	0.5784	0.1681
-Watching Tv prog.	0.4243	0.3381	0.5828	0.5145	0.2874
-Watching Tv adv.	0.4775	0.2516	0.6112	0.5810	0.2467
-Listening to radio programme	0.3636	0.2359	0.3719	0.4633	0.1693
-Reading Extension publication	0.1862	0.1192	0.3051	0.2461	0.1003
-Involvement in training course	0.3823	0.3491	0.4214	0.5426	0.2267
-All communicational factors	0.5122	0.3785	0.6466	0.6590	0.2938
-Money brings happiness	0.0877	0.3479	0.3412	0.3221	0.2352
-Family burden	0.1940	0.3365	0.3329	0.3721	0.3721
-Fortunate	0.2898	0.1576	0.3868	0.4100	0.0265
-Proverbs	0.2734	0.1105	0.1318	0.2637	0.1123

	Progressive	Efficient	Innovative	Proper	Experienced
-Attitude towards rain-fed farming (directly)	0.3125	0.2831	0.2652	0.3637	0.3115
-Attitude towards rain-fed farming (indirectly)	0.1761	0.0588	0.2057	0.2420	0.2474
-Innovation is risky	-0.4024	-0.3259	-0.6531	-0.5496	-0.1789
-View of being the first to adopt	0.3056	0.3750	0.5797	0.4954	0.1754
-Speed of adoption	0.3255	0.4468	0.8603	0.6369	0.1495
-Innovation is easier	0.2943	0.4418	0.3176	0.3604	0.3261
-Innovation is time savers	0.2813	0.1426	0.2106	0.1888	0.2160
-Innovation is compatible	0.4125	0.2783	0.4930	0.5451	0.3184
-Progressive***	0.6480	0.4581	0.7217	0.7686	0.4391
-Efficient***	0.5786	0.7970	0.5043	0.5692	0.5819
-Innovative***	0.4844	0.3344	0.8924	0.6602	0.0800
-Proper***	0.7086	0.4458	0.7247	0.7828	0.4584
-Experienced***	0.5957	0.5673	0.3400	0.6122	0.8595
-Defeat in arguments	0.2423	0.0852	0.3154	0.4129	0.1291
-Reaction to news	0.1740	0.3950	0.1624	0.1433	0.2613
-Willing to change	0.4302	0.4070	0.4125	0.4826	0.1713
-Not satisfy with your progress in farming	0.2446	0.2236	0.2598	0.3253	0.1074
-Desire to be well off	0.1714	0.3849	0.4548	0.3873	0.3140

***: Ideal Self

Table C.30: The relationships between the Self-Concept (Other Self) and all of the related variables of the Personal and Socio-Economic, Economic and Institutional, and Psychological factors in Zone2

	Progressive	Efficient	Innovative	Proper	Experienced
-Farm size	0.4750	0.4821	0.5536	0.6207	0.4207
-Family size	0.3975	0.3281	0.3752	0.6841	0.5397
-Labour	0.0123	0.2816	0.3282	0.4199	0.1297
-Machinery and eqiup.	0.2017	0.3666	0.3927	0.5956	0.3992
-Credit and money	0.3608	0.0866	0.1588	0.4422	0.1974
-Perception of the cost of innovation	0.2964	0.1966	0.2328	0.4341	0.1573
-Money brings happiness	0.1514	0.1449	0.2362	0.4445	0.0657
-Attitude towards rain-fed farming (indirectly)	0.4533	0.1290	0.2068	0.4455	0.4164
-Innovation is risky	-0.3277	-0.1917	-0.6250	-0.7057	-0.3131
-Speed of adoption	0.4940	0.3356	0.4466	0.5147	0.3806
-Innovation is time savers	0.1594	0.0000	0.2070	0.5003	-0.0653
-Innovation is compatible	0.3250	0.4328	0.5319	0.6806	0.4176
-Progressive***	0.5822	0.4852	0.6354	0.5091	0.2191
-Efficient***	0.4715	0.6058	0.4466	0.5715	0.0790
-Innovative***	0.5255	0.4612	0.8254	0.7544	0.2232
-Proper***	0.5025	0.3014	0.4303	0.5506	0.2370
-Experienced***	0.6382	0.2684	0.5236	0.6700	0.8003
-Desire to be well off	0.2017	0.2402	0.1018	0.4095	0.1927

***: Ideal Self

Table C.31: The relationships between the Self-Concept (Ideal Self) and all of the related variables of the Personal and Socio-Economic, Economic and Institutional, Communicational and Psychological factors in Zone1

	Progressive	Efficient	Innovative	Proper	Experienced
-Fragmentation	0.5596	0.4962	0.4189	0.5399	0.4454
-Family size	0.4953	0.3501	0.3683	0.4930	0.4765
-Family type	0.2166	0.1237	0.3348	0.2189	0.1326
-Literacy	0.4667	0.2156	0.4276	0.5208	0.1732
-Family Education	0.4311	0.3659	0.1916	0.4373	0.4149
-Machinery and equip.	0.6183	0.3963	0.4190	0.5914	0.4516
-Road condition	0.2986	0.3213	0.2835	0.2999	0.3394
-Credit and money	0.4861	0.2481	0.3446	0.5064	0.4097
-Cash crop	0.2141	0.2131	0.1745	0.2014	0.0206
-Perception of the accessibility of inn.	0.3070	0.3443	0.2781	0.3699	0.3748
-Perception of the cost of innovation	0.6794	0.5717	0.4844	0.7053	0.6106
-Total sources of information	0.5492	0.3025	0.5626	0.6934	0.3600
-Farmers visits to Extension	0.4119	0.3118	0.3492	0.4144	0.2747
-Extension agent visits to farmer	0.3949	0.3087	0.3539	0.5287	0.3226
-Farmer visit to the cooperative	0.1733	0.0571	0.2722	0.3975	0.2522
-Farmers attendance to coop. meeting	0.2494	0.1396	0.3167	0.4916	0.3422
-Involvement in Extension plot	0.5482	0.2655	0.5839	0.5582	0.3194
-Watching Tv prog.	0.5253	0.3852	0.5506	0.5308	0.3624
-Watching Tv adv.	0.6316	0.4284	0.5238	0.6339	0.3592
-Listening to radio programme	0.4276	0.1822	0.4821	0.5671	0.3338
-Reading Extension publication	0.3026	0.2228	0.2659	0.4467	0.2518
-Involvement in training course	0.4610	0.2753	0.3530	0.4401	0.3380
-All communicational factors	0.6242	0.4201	0.6160	0.7687	0.5075
-Money brings happiness	0.2789	0.2615	0.2774	0.2250	0.1650
-Family burden	0.2952	0.2951	0.2243	0.3176	0.4213
-Fortunate	0.2936	0.1886	0.3853	0.2500	0.1378
-Proverbs	0.2294	0.1272	0.2086	0.2827	0.2072

	Progressive	Efficient	Innovative	Proper	Experienced
-Attitude towards rain-fed farming (directly)	0.3818	0.4798	0.2693	0.3080	0.3536
-Attitude towards rain-fed farming (indirectly)	0.3324	0.2910	0.2211	0.2441	0.3041
-Innovation is risky	-0.6549	-0.3274	-0.5918	-0.5761	-0.2199
-View of being the first to adopt	0.4953	0.3135	0.6474	0.4590	0.3249
-Speed of adoption	0.7268	0.4085	0.7670	0.6355	0.2397
-Innovation is easier	0.3211	0.4407	0.3099	0.3117	0.3343
-Innovation is time savers	0.1838	0.3470	0.2832	0.5262	0.3381
-Innovation is compatible	0.6421	0.3846	0.4682	0.5925	0.4581
-Progressive*	0.8937	0.5550	0.7764	0.8653	0.6848
-Efficient*	0.5173	0.4990	0.5275	0.5008	0.4686
-Innovative*	0.7157	0.4190	0.9091	0.6929	0.5815
-Proper*	0.8398	0.5374	0.7656	0.8893	0.7776
-Experienced*	0.4509	0.4183	0.4045	0.4623	0.5490
-Defeat in arguments	0.2385	0.0553	0.3275	0.3257	0.2490
-Reaction to news	0.0695	0.1296	0.0436	0.1473	0.1204
-Willing to change	0.2756	0.3500	0.4325	0.4108	0.3114
-Not satisfy with your progress in farming	0.1646	0.1814	0.3120	0.3369	0.2111
-Desire to be well off	0.3158	0.3786	0.4530	0.2689	0.2524

*: Cognized

Table C.32: The relationships between the Self-Concept (Ideal Self) and all of the related variables of the Personal and Socio-Economic, Economic and Institutional, and Psychological factors in Zone2

	Progressive	Efficient	Innovative	Proper	Experienced
-Farm size	0.7693	0.4325	0.4933	0.7206	0.5005
-Family size	0.4427	0.2746	0.5485	0.5966	0.4626
-Labour	0.2839	0.3687	0.2516	0.3618	0.3667
-Machinery and equip.	0.4082	0.2787	0.4406	0.5375	0.4414
-Credit and money	0.2052	0.3831	0.3772	0.3862	0.3264
-Perception of the cost of innovation	0.5519	0.3488	0.1934	0.2633	0.2752
-Money brings happiness	0.1696	0.5326	0.2020	0.3301	0.3067
-Attitude towards rain-fed farming (indirectly)	0.2545	0.1319	0.1285	0.2286	0.4681
-Innovation is risky	-0.2692	-0.2225	-0.7127	-0.3881	-0.5072
-Speed of adoption	0.2749	0.4219	0.3889	0.2972	0.6214
-Innovation is time savers	0.0561	0.5103	0.3344	0.1821	0.1269
-Innovation is compatible	0.5247	0.3881	0.5484	0.5675	0.4995
-Progressive*	0.6940	0.5149	0.5217	0.5247	0.6466
-Efficient*	0.2868	0.6759	0.4552	0.6924	0.5344
-Innovative*	0.5742	0.5412	0.9353	0.8226	0.3424
-Proper*	0.6463	0.2448	0.5642	0.4679	0.6060
-Experienced*	0.5230	0.2054	0.4751	0.3954	0.2924
-Desire to be well off	0.0532	0.4255	0.0881	0.1536	0.3411

*: Cognized

APPENDIX D

Reasons for the adoption and rejection of some of the studied innovations

Table D.1: The distribution of farmers according to their perception of the reasons that caused rejection of the chemical fertilizers (never tried chemical fertilizers, the total were 14 farmers)

Reasons	Frequency of ranking individual reasons by farmers									Total		%		Final rank
	1	2	3	4	5	6	7	8	9	Yes	No	Yes	No	
-Fertilizer was not available on time	2	1	1	2	0	0	0	0	0	6	8	43	57	2
-Lack of capital	0	2	2	3	0	1	1	0	0	9	5	64	36	1
-Fertilizer is expensive in black market	0	2	1	0	1	1	0	0	0	5	9	36	64	4
-Risky	2	1	2	0	1	0	0.	0	0	6	8	43	57	2
-Lack of trust in Extension	0	0	0	0	2	0	1	0	0	3	11	21	79	5
-Lack of labour	0	0	0	0	0	0	1	0	0	1	13	7	93	10
-Have a lot of weed	0	0	0	0	0	1	0	1	0	2	12	14	86	7
-Neighbour do not use fertilizers	0	1	0	0	1	0	0	0	0	2	12	14	86	7
-My land too small	1	0	0	0	0	0	0	0	0	1	13	7	93	10
-Not aware of its use	0	3	0	0	0	0	0	0	0	3	11	21	79	5
-Difficult to obtain	2	0	0	0	0	0	0	0	0	2	12	14	86	7
-I do not care about rain-fed part	1	0	0	0	0	0	0	0	0	1	13	7	93	10
-My land is too fertile	1	0	0	0	0	0	0	0	0	1	13	7	93	10

Table D.2: The distribution of farmers according to their perception of the reasons that caused rejection of the herbicide (never tried herbicide, the total were 37 farmers)

Reasons	Frequency of ranking indi									Total		%		Final
	vidual reasons by farmers													rank
	1	2	3	4	5	6	7	8	9	Yes	No	Yes	No	
-Herbicides were not available on time	6	4	5	1	1	0	0	0	0	17	20	46	54	8
-Kill wheat	0	0	1	0	0	0	0	0	0	1	36	3	93	14
-Lack of spray equipment	2	4	8	10	2	1	1	0	0	9	28	76	24	1
-Expensiveness	1	2	2	4	4	3	2	1	0	19	18	51	49	6
-Not aware of its use	13	7	1	0	3	1	2	0	0	27	10	73	27	3
-Lack of capital	1	2	2	2	2	4	3	1	1	18	19	49	51	7
-Availability of cheap labour	0	1	3	2	0	1	0	0	0	7	30	19	81	10
-Dangerous to health	0	1	4	3	2	6	6	2	1	25	12	68	32	5
-Neighbour do not use herbicides	0	3	1	6	4	3	0	0	0	17	20	46	54	8
-Not a lot of weed	2	0	0	0	0	0	0	0	0	2	35	5	95	12
-Difficult to use	2	7	4	7	4	2	1	0	0	27	10	73	27	3
-Waste time	0	0	0	0	1	0	0	1	0	2	35	5	95	12
-Government is doing the job why should I bother	7	0	0	0	0	0	1	1	0	9	28	76	24	1
-Not been given it by credit	0	1	0	2	1	1	0	1	1	7	30	19	81	10
-Lack of trust in Extension	0	0	1	0	0	0	0	0	0	1	36	3	97	14
-Do not care	1	0	0	0	0	0	0	0	0	1	36	3	97	14

Table D.3: The distribution of farmers according to their perception of the reasons that caused rejection of sowing machine (never tried Sowing machine, the total were 17 farmers)

Reasons	Frequency of ranking individual reasons by farmers									Total		%		Final rank
	1	2	3	4	5	6	7	8	9	Yes	No	Yes	No	
-Machine was not available on time	4	6	0	1	0	0	0	0	0	11	6	65	35	1
-Lack of capital	0	1	2	1	0	0	0	1	0	5	12	29	71	4
-My farm is small	2	0	0	0	0	0	0	0	0	2	15	12	88	8
-It is expensive to hire	0	1	1	0	1	0	0	0	0	3	14	18	82	7
-Difficult to find and No body like to let it	0	1	1	0	0	0	0	0	0.	2	15	12	88	8
-Availability of cheap labour	1	0	4	1	2	1	0	0	0	9	8	53	47	2
-My land is too much fragmented	6	3	0	0	0	0	0	0	0	9	8	53	47	2
-Hand is better	2	1	2	0	0	0	0	0	0	5	12	29	71	4
-Seed consumer	1	0	2	2	0	0	0	0	0	5	12	29	71	4
-Needs a lot of cultivation	0	1	0	0	0	0	0	0	0	1	16	6	94	11
-Needs chemical fertilizers	0	0	1	0	0	0	0	0	0	1	16	6	94	11
-Neighbour do not use it	0	0	0	1	0	0	1	0	0	2	15	12	88	8
-The land is wet at planting time	1	0	0	0	0	0	0	0	0	1	16	6	94	11

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APPENDIX E

Self-Concept

Table E.1: The distribution of farmers by their Cognized Self

Statment	% of farmers in both zones (60)					% of farmers in Zone1 (40)					% of farmers in Zone2 (20)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
hline Progressive	3	25	45	27	0	5	23	40	33	0	0	30	55	15	0
Efficient	10	12	60	10	8	8	10	63	10	10	15	15	55	10	5
Innovative	20	18	32	15	15	25	20	18	18	20	10	15	60	10	5
Proper	5	25	48	22	0	5	23	45	28	0	5	30	60	5	0
Experienced	15	15	55	13	2	18	10	55	15	3	10	25	55	10	0

Table E.2: The distribution of HIGH, MEDIUM and LOW adopters in Zone1 according to their perceived Cognized Self

Statment	% of HIGH adopters					% of MEDIUM adopters					% of LOW adopters				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
hline Progressive	0	0	14	86	0	4	26	44	26	0	10	30	50	10	0
Efficient	0	0	86	0	14	4	9	57	18	13	20	20	60	0	0
Innovative	0	0	0	29	71	31	13	22	22	13	30	50	20	0	0
Proper	0	0	14	86	0	4	18	57	22	0	10	50	30	10	0
Experienced	0	0	43	57	0	9	4	78	9	0	50	30	10	0	10

Table E.3: The distribution of HIGH, MEDIUM and LOW adopters in Zone2 according to their perceived Cognized Self

Statment	% of HIGH adopters					% of MEDIUM adopters					% of LOW adopters				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
hline Progressive	0	0	33	67	0	0	25	75	0	0	0	44	44	11	0
Efficient	33	0	33	33	0	0	25	63	13	0	11	11	66	0	11
Innovative	0	0	67	0	33	0	38	50	13	0	22	11	56	11	0
Proper	0	0	67	33	0	0	38	63	0	0	11	33	56	0	0
Experienced	0	0	67	33	0	13	25	63	0	0	11	33	44	11	0

Table E.4: The distribution of farmers by their Other Self

Statment	% of farmers in both zones (60)					% of farmers in Zone1 (40)					% of farmers in Zone2 (20)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
hline Progressive	7	23	40	28	3	3	18	45	30	5	15	35	25	25	0
Efficient	17	17	30	17	20	18	13	25	18	28	15	25	35	15	10
Innovative	23	20	32	8	17	28	18	22	8	23	15	25	45	10	5
Proper	5	28	48	8	10	5	25	45	13	13	5	35	55	0	5
Experienced	7	12	48	23	10	5	10	50	25	10	10	15	45	20	10

Table E.5: The distribution of HIGH, MEDIUM and LOW adopters in Zone1 according to their perceived Other Self

Statment	% of HIGH adopters					% of MEDIUM adopters					% of LOW adopters				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
hline Progressive	0	0	14	71	14	0	13	57	26	4	10	40	40	10	0
Efficient	0	14	0	43	43	13	4	35	18	31	40	30	20	0	10
Innovative	0	0	0	29	71	35	13	31	4	18	30	40	30	0	0
proper	0	0	0	43	57	0	26	61	9	4	20	40	40	0	0
Experienced	0	0	29	57	14	4	9	52	26	9	10	20	60	0	10

Table E.6: The distribution of HIGH, MEDIUM and LOW adopters in Zone2 according to their perceived Other Self

Statment	% of HIGH adopters					% of MEDIUM adopters					% of LOW adopters				
	1	2	3	4	5	1	2	3	4	5	1	2	3	.4	5
hline Progressive	0	0	0	100	0	13	38	38	13	0	22	44	22	11	0
Efficient	33	33	0	0	33	0	25	50	25	0	22	22	33	11	11
Innovative	33	0	33	0	33	13	25	63	0	0	11	33	33	22	0
proper	0	0	67	0	33	0	38	63	0	0	11	44	44	0	0
Experienced	0	0	33	0	67	0	25	38	38	0	22	11	56	11	0

Table E.7: The distribution of farmers by their Ideal Self

Statment	% of farmers in both zones (60)					% of farmers in Zone1 (40)					% of farmers in Zone2 (20)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
hline Progressive	3	18	45	27	7	5	18	40	33	5	0	20	55	15	10
Efficient	3	8	30	27	32	3	8	20	30	40	5	10	50	20	15
Innovative	15	17	32	17	20	20	18	18	18	28	5	15	60	15	5
Proper	2	20	52	8	18	3	20	45	10	23	0	20	65	5	10
Experienced	5	5	48	25	17	8	8	40	25	20	0	5	60	25	10

Table E.8: The distribution of HIGH, MEDIUM and LOW adopters in Zone1 according to their perceived Ideal Self

Statment	% of HIGH adopters					% of MEDIUM adopters					% of LOW adopters				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
hline Progressive	0	0	0	71	29	4	18	48	31	0	10	30	50	10	0
Efficient	0	0	0	57	43	0	4	13	31	52	10	20	50	10	10
Innovative	0	0	0	29	71	22	18	22	22	18	30	30	20	0	20
Proper	0	0	0	14	86	0	18	61	13	9	10	40	40	0	10
Experienced	0	0	0	57	43	4	9	48	26	13	20	10	50	0	20

Table E.9: The distribution of HIGH, MEDIUM and LOW adopters in Zone2 according to their perceived Ideal Self

Statment	% of HIGH adopters					% of MEDIUM adopters					% of LOW adopters				
	1	2	3	4	5	1	2	3	4	5	1	. 2	3	4	5
hline Progressive	0	0	33	33	33	0	13	63	25	0	0	33	56	0	11
Efficient	0	0	33	33	33	0	13	50	25	13	11	11	56	11	11
Innovative	0	0	67	0	33	0	25	63	13	0	11	11	56	22	0
Proper	0	0	33	33	33	0	13	88	0	0	0	33	56	0	11
Experienced	0	0	33	0	67	0	0	50	50	0	0	11	78	11	0

APPENDIX F

Multiple and simple regression analysis

Table F.1: Multiple regression analysis for factors influencing the adoption behaviour of farmers in Zone1

Factors	a	R^2 cumu-lative	b	SE	T	T(p)	F	F(p)
Self-Concept		0.65	6.90	1.59	4.34	<0.001	11.03	<0.01
Having Ext. plot on farm		0.69	4.05	1.61	2.52	<0.05		
Availability of credit and cash money		0.74	4.46	1.67	2.67	<0.05		
	-5.06							

Table F.1: Multiple regression analysis for factors influencing the adoption behaviour of farmers in Zone1

Factors	a	R^2 cumulative	b	SE	T	T(p)	F	F(p)
Self-Concept		0.65	6.90	1.59	4.34	<0.001	11.03	<0.01
Having Ext. plot on farm		0.69	4.05	1.61	2.52	<0.05		
Availability of credit and cash money		0.74	4.46	1.67	2.67	<0.05		
	-5.06							

Table F.2: Multiple regression analysis for factors influencing the adoption behaviour of farmers in Zone2

Factors	a	R^2 cumulative	b	SE	T	T(p)	F	F(p)
Self-Concept		0.48	5.92	1.39	4.27	<0.001	9.81	<0.01
Availability of machinery and equipment		0.67	6.57	2.10	3.13	<0.01		
	3.08							

Table F.5: The relationships between the "adoption behaviour scores" of farmers and all of the Personal and Socio-Economic, Economic and Institutional, Communicational and Psychological factors

	Zone1		Zone2	
	r	p	r	p
-Farm size	0.2235	NS	0.5746	<0.01
-Labour	-0.2201	NS	-0.4369	0.05
-Fragmentation	0.5103	<0.001	0.4097	NS
-Family size	0.4850	<0.01	0.6355	<0.01
-Family type	0.3194	<0.05	0.3441	NS
-Literacy	0.3972	<0.05	0.3259	NS
-Family Education	0.4237	<0.01	0.2511	NS
-Machinery and equipment	0.6053	<0.001	0.5640	0.01
-Road condition of farm	0.4497	<0.01	0.2192	NS
-Credit and money	0.6259	<0.001	0.5070	<0.05
-Cash crop	0.3662	<0.05	0.4236	NS
-Perception of the accessibility of innovation	0.3666	<0.05	0.0831	NS
-Perception of the cost of innovation	0.7444	<0.001	0.4830	<0.05
-Total sources of information	0.6878	<0.001	0.4020	NS
-Farmers visits to Extension	0.5318	<0.001	0.4218	NS
-Extension agent visits to farmer	0.5032	0.001	0.2928	NS
-Farmer visit to the cooperative	0.4542	<0.01	0.1535	NS
-Farmers attendance to coop. meeting	0.4875	<0.01	0.0979	NS
-Involvement in Extension plot	0.6390	<0.001	0.1529	NS
-Watching Tv programme	0.4081	<0.01	0.3544	NS
-Watching Tv advertisement	0.5101	<0.001	0.0385	NS
-Listening to radio programme	0.4120	<0.01	0.1564	NS
-Reading Extension publication	0.0.3663	<0.05	-0.0998	NS
-Involvement in training course	0.5119	<0.001	0.0114	NS
-All communicational factors	0.7246	<0.001	0.2869	NS
-Money brings happiness	0.3666	<0.05	0.4413	0.05
-Family burden	0.3979	0.01	0.2444	NS
-Fortunate	0.3373	<0.05	0.3970	NS
-Proverbs	0.3084	0.05	0.1578	NS

	Zone1		Zone2	
	r	p	r	p
-Attitude towards rain-fed farming (directly)	0.4000	0.01	0.1009	NS
-Attitude towards rain-fed farming (indirectly)	0.3645	<0.05	0.4808	<0.05
-Innovation is risky	-0.5817	<0.001	-0.4388	0.05
-View of being the first to adopt	0.3922	<0.05	0.3339	NS
-Speed of adoption	0.6021	<0.001	0.5109	<0.05
-Progressive (Cognized)	0.5699	<0.001	0.5352	<0.05
-Efficient (Cognized)	0.3735	<0.05	0.1933	NS
-Innovative (Cognized)	0.7269	<0.001	0.5285	<0.05
-Proper (Cognized)	0.5795	<0.001	0.6066	<0.01
-Experienced (Cognized)	0.6208	<0.001	0.4394	<0.05
-Progressive (Other)	0.5999	<0.001	0.6946	<0.001
-Efficient (Other)	0.4993	<0.01	0.2053	NS
-Innovative (Other)	0.6828	<0.001	0.3420	NS
-Proper (Other)	0.8043	<0.001	0.7274	<0.001
-Experienced (Other)	0.4061	<0.01	0.6217	<0.01
-Progressive (Ideal)	0.6934	<0.001	0.4745	<0.05
-Efficient (Ideal)	0.5229	<0.001	0.4368	0.05
-Innovative (Ideal)	0.5661	<0.001	0.4830	<0.05
-Proper (Ideal)	0.7453	<0.001	0.4676	<0.05
-Experienced (Ideal)	0.5656	<0.001	0.6789	0.001
-Innovation is easier	0.4380	<0.01	0.3938	NS
-Innovation is time savers	0.3235	<0.05	0.4358	0.05
-Innovation is compatible	0.5617	<0.001	0.6066	<0.01
-Defeat in arguments	0.3532	<0.05	-0.0831	NS
-Reaction to news	0.3461	<0.05	0.3401	NS
-Willing to change	0.4698	<0.01	0.3574	NS
-Not satisfy with your progress in farming	0.3639	<0.05	0.3773	NS
-Desire to be well off	0.4411	<0.01	0.5149	<0.05

APPENDIX G

Questionnaire

- City .....
- District .....
- Sub-district .....
- Village ..... Date .....

G.1 Socio-Economic Set

1. Age .....
2. Farm size
   - Total plots .....
   - Area of the largest and smallest plot ....., ...
3. Your family
   - Size .....
   - Type: a: Nuclear b: Extended 1 c: Extended 2
4. Your education
   - Can you read and write? a: Yes ..... b: No .....
   - If yes, did you study at school? a: Yes.... To which stage ..... b: No ....
5. Your family back ground

No.	Sex		Age	Level of education	Participation in farming
	M	F			
1					
2					
3					
4					
5					
6					
7					

Extend on the back of this sheet if it is necessary

6. Did you at any time reside outside your village? a: Yes b: No
7. How long have you been a farmer cultivating wheat? ....., ...
8. Land possession
    - Own (one owner)
    - Own (more than one owner)
    - Rent
    - Sharing
    - Reform
    - Others
9. Soil fertility
    - High
    - Medium
    - Low
10. Farm location
    - Distance from your residency .....
    - Distance from the big village .....
    - Distance from Mantika .....
    - Distance from city .....
    - Distance from Extension .....
    - Distance from Market .....
11. Your own transport is.....
12. Farm road conditions.....
13. Your own agricultural machinery and equipment

Type	Total
1	
2	
3	
4	
5	
6	

14. Animal property

Type	Total
Sheep	
Cow	
Goat	
Others	

15. Your income from wheat compared to other income

    - Wheat income = Other crops income
    - Wheat income > Other crops income
    - Wheat income < Other crops income

16. Your wheat income compared to gross income of the house hold

    - The gross income is coming from wheat only
    - 3/4 of the gross income is coming from wheat
    - 1/2 of the gross income is coming from wheat
    - wheat income is very small part of income

17. Your labour force

    - Family labour only
    - Family labour > out labour
    - Family labour= out labour
    - Family labour < out labour
    - Outside labour only

18. Do you have off farm job? a: Yes b: No

    If yes, if you compare your off farm earning with your farm income which is better?

    - Farm better
    - Both the same
    - Off job better

19. How do you feel about the price of wheat when you compare it with other crops? a: good....., b: fair....., c: low.....

20. How many years out of the last ten do you regard as a good, normal and bad with respect to your wheat crop?

    - Good .....
    - Medium .....
    - Bad .....

21. How many bags of wheat grain do you get per hectare when years are good, normal, and bad?

    - Good .....
    - Medium .....
    - Bad .....

22. Through the whole years of your experience in growing wheat, can you state the proportion of bad, normal and good years?

    - Good .....%
    - Normal.....%
    - Bad .....%

G.2 Cultural set

1. I would like you to tell me the degree to which you would like the following jobs for earning your living and please rank these jobs in accordance to their priority for you? (Like very much =5, Like=4, Neutral=3, Dislike=2, and Dislike very much=1).

No.	Job	Score	Rank
1.	Rain-fed farming	1----2----3----4----5	----
2.	Irrigated farming	1----2----3----4----5	----
3.	Animal raising	1----2----3----4----5	----
4.	Machinery	1----2----3----4----5	----
5.	Trade	1----2----3----4----5	----
6.	Government employment	1----2----3----4----5	----
7.	Other self employment	1----2----3----4----5	----

2. Could you tell me the degree to which you agree or disagree with the following statements? Agree=3, Agree in part=2, and Disagree=1.

1.	The future of your family is very important for you	1	2 3
2.	Our fathers planted for us to eat and we are doing the same for our children	1	2 3
3.	A very hard working man is good	1	2 3
4.	Doing some agricultural practices are demeaning	1	2 3
5.	In order to have better life we should go back to our traditional life	1	2 3
6.	Superstition is real, people should believe in it	1	2 3
7.	You believe in omens	1	2 3
8.	Money bring happiness	1	2 3

9.Your practical knowledge in farming better than Ext. worker	1	2	3
10.Working hard or less is the same	1	2	3
11.The development of agriculture does not depend on Extension	1	2	3
12.Willing to change your agriculture to be better	1	2	3
13.Replacing traditional practices by a new one is going to disown the forbearers	1	2	3
14.Research is necessary for agricultural development	1	2	3
15.You like to be well off	1	2	3
16.Farmers can develop their farming by themselves only	1	2	3
17.You like to imitate progressive farmers	1	2	3
18.You like to be imitated by other farmers	1	2	3
19.Satisfied with your progress in farming	1	2	3
20.Your family is a burden on you	1	2	3
21.Using new ideas for the first time is risky	1	2	3
22.Recent farming practices are much easier than in the past	1	2	3
23.Innovations are time savers	1	2	3
24.Innovations are compatible with your farm equipment	1	2	3

3. Can you tell me first how do you see your self, second how other farmers see you and third how would like to be seen in relation to the following statements? (eg. very progressive=5, progressive=4, neutral=3, traditional=2, very traditional=1.

	See your self					Other see you					Would like to be seen				
Progressive-Traditional	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
Skillful-Unskillful	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
Efficient-Not efficient	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
Innovative-Not innovative	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
Good coop. member-Not good member	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
Trust full-															

Not trust full	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
Proper farmer- Not proper	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
Experienced- Not experienced	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
Fortunate- Unfortunate	5	4	3	2	1	5	4	3	2	1	5	4	3	2	1

4. If you are asked to participate in the following would do so?

a.Attend Extension meeting	Yes	No	Not sure
b.Attend field day	Yes	No	Not sure
c.Attend any type of agricultural activities	Yes	No	Not sure
d.Attend Extension film show	Yes	No	Not sure
e.Listen to any specific Extension programme	Yes	No	Not sure
f.Perform Extension plot	Yes	No	Not sure
g.Attend training course	Yes	No	Not sure
h.Join ny Extension group	Yes	No	Not sure
i.Accept regular visit by Extension worker	Yes	No	Not sure
k.Visit Extension workers	Yes	No	Not sure
l.Asking other farmers for help	Yes	No	Not sure
m.To be Extension contact farmer	Yes	No	Not sure
n.To be involved in Extension planning	Yes	No	Not sure

5. Where do you put your self among other farmers in relation to the adoption of innovations?

   - In the first group who adopt in the first year
   - In the second group who adopt in the second year
   - In the third group who adopt the third year
   - Among farmers who do not easily adopt

6. Can you state your social participation?

   - Elite (Mukhtar)
   - Head of cooperative
   - Cooperative member
   - Any group leader or member

- None

7. How often do you share decision with your wife in the following affairs?
   - Family affairs a: Always b: Sometimes c: Rarely d: Not at all
   - Farming affairs a: Always b: Sometimes c: Rarely d: Not at all
8. Who makes the final decision in farming?
   - Yourself
   - Yourself plus your wife
   - Yourself plus your brother, sister, mother etc.
   - The whole family
9. How many agricultural proverbs do you keep? Number ..... Tell me them please? ....

   ....

   ....

   ....

   ....

   ....

   None turn to 12
10. Do you believe in them? a: Yes b: No
11. Do you apply them in your agricultural practices?

    `a.Always  b.Sometimes  c.Rarely  d.Not at all`
12. When you are involved in discussion with some farmer about farming and you find out that he or she is a more knowledgeable man/woman than you, what would be your reaction?
    - Increase his her status from the point of your view
    - Blame yourself
    - Wish to be like him
    - Do not care
13. What does it mean to you if you are the first to adopt an innovation in your village?
    - Proud of it
    - Normal
    - Does not mean any thing
14. If you hear about some thing, what ever it is, what would be your reaction to it?
    - Want to know about it in details
    - Want to know little about it
    - Do not care

G.3 Institutional Set

1. Where do you get the following inputs?

   - Wheat seeds ....., ..., ..., ...
   - Fertilizers ....., ..., ..., ...
   - Herbicides ....., ..., ..., ...
   - Pesticides ....., ..., ..., ...
   - Tractors ....., ..., ..., ...
   - Sowing machine ....., ..., ..., ...
   - Spray equipment ...., ..., ..., ...
   - Farming transport .., ..., ..., ...
   - Credit ....., ..., ..., ...

2. How do you feel about getting the above inputs? (e.g Easy=3, Medium=2, and Difficult=1.

   - Wheat seeds 1 2 3
   - Fertilizers 1 2 3
   - Herbicides 1 2 3
   - Pesticides 1 2 3
   - Tractors 1 2 3
   - Sowing machine 1 2 3
   - Spray equipment 1 2 3
   - Farming transport 1 2 3
   - Credit 1 2 3

3. How do you feel about the coast of the above inputs (rent or buy) e.g Cheap=3, Fair=2, Expensive=1.

   - Wheat seeds 1 2 3
   - Fertilizers 1 2 3
   - Herbicides 1 2 3
   - Pesticides 1 2 3
   - Tractors 1 2 3
   - Sowing machine 1 2 3
   - Spray equipment 1 2 3
   - Farming transport 1 2 3
   - Credit 1 2 3

4. Do you sell your production? a: Yes b: No

   If "Yes" Where? ....., ..., ...,
   and How do you feel about selling?

   a: Easy
   b: Medium
   c: Difficult

5. How do you feel about the contact with Extension?

a: Easy
b: Medium
c: Difficult

G.4 Communicational behaviour set

1. Where do you get your information about farming practices, rank them in the priority for the greatest benefit of you?

Source of information	Rank
1	
2	
3	
4	
5	
6	
7	
8	

2. Did you hear about agricultural Extension? a: Yes, When? .....,
   b: No
3. Do you know what Extension stand for? ....
4. Do you have your own agricultural extension agent? a: Yes,
   Since .....,
   b: No
5. Do you visit Extension agent (or any agricultural organization) at his office in order to seek advices and new information?

   a: Yes, Since ....., How often do you visit?
   i.Always (number of visits a year) .....
   ii.Sometimes (number of visits a year) ....
   iii.Rarely (number of visits a year) .....
   b. No

6. Does Extension agent visit you?

   a: Yes, Since ....., How often do you visit?
   i.Always (number of visits a year) .....
   ii.Sometimes (number of visits a year) ....
   iii.Rarely (number of visits a year) .....
   b. No

7. Did you ask Extension agent to visit you? a: Yes, b: No

8. How do you evaluate the Extension agent from the point of providing you with new information and persuading you to adopt innovations?

   a.Information: i: Good ii: Medium iii: Useless
   iv: Do not know
   b.Persuasion: i: Good ii: Medium iii: Useless
   iv: Do not know

9. If you face any agricultural problem, where would you go to solve it?

   a:Neighbour, b:Extension,
   c:Some agricultural organisation, c: Others
   d:Do not ask any Why? ....
   .....

10. Do you visit the village cooperative?

    a: Yes, Since ....., How often do you visit?
    i.Always (number of visits a year) .....
    ii.Sometimes (number of visits a year) ...
    iii.Rarely (number of visits a year) .....
    b. No

11. Do you attend village cooperative meeting?

    a: Yes, Since ....., How often do you visit?
    i.Always (number of visits a year) .....
    ii.Sometimes (number of visits a year) ...
    iii.Rarely (number of visits a year) .....
    b. No

12. How do you evaluate the village cooperative from the point of providing you with new information and persuading you to adopt innovations?

    a.Information: i: Good ii: Medium iii: Useless
    iv: Do not know
    b.Persuasion: i: Good ii: Medium iii: Useless
    iv: Do not know

13. Did you hear of Extension plots or field demonstrations?

    a: Yes, Since ....., b. No

14. How did you hear about Extension plot?

a: Just hearing from somebody without knowing what
it looks like
b: Just visiting it in somebody's field
c: Performing it in your land, How many time? .....

15. How do you evaluate the Extension plot from the point of providing you with new information and persuading you to adopt innovations?

a.Information: i: Good ii: Medium iii: Useless
iv: Do not know
b.Persuasion: i: Good ii: Medium iii: Useless
iv: Do not know

16. Do you have television set? a: Yes Since ....., Turn to 18 b: No .....
turn to 17

17. Do you watch somebody's television?

1: Yes, Since ....., How often do you watch?
i.Always
ii.Sometimes
iii.Rarely
Do you hear about Our Green land Programme?
a: Yes .... Do you watch it? -Yes .. How often?
i.Always
ii.Sometimes
iii.Rarely
-No ..... Turn to 19
b: No .... Turn to 19
How do you evaluate the Our Green Land from the point of providing you with new information and persuading you to adopt innovations?

a.Information: i: Good ii: Medium iii: Useless
iv: Do not know
b.Persuasion: i: Good ii: Medium iii: Useless
iv: Do not know
2. No ..... Turn to 20

18. Do you watch it?

1: Yes, Since ....., How often do you watch?
i.Always
ii.Sometimes
iii.Rarely
Do you hear about Our Green land Programme?
a: Yes .... Do you watch it? -Yes .. How often?
i.Always
ii.Sometimes

iii.Rarely
-No ..... Turn to 19

b: No .... Turn to 19

How do you evaluate the Our Green Land from the point of providing you with new information and persuading you to adopt innovations?

a.Information: i: Good ii: Medium iii: Useless
iv: Do not know
b.Persuasion: i: Good ii: Medium iii: Useless
iv: Do not know
2. No ..... Turn to 19

19. Did you hear about agricultural advertisements (spots)?

1: Yes, Since ....., Do you watch it?
a: Yes..... How often do you watch?
i.Always
ii.Sometimes
iii.Rarely
b: No .... Turn to 20

How do you evaluate the TV advertisement from the point of providing you with new information and persuading you to adopt innovations?

a.Information: i: Good ii: Medium iii: Useless
iv: Do not know
b.Persuasion: i: Good ii: Medium iii: Useless
iv: Do not know
2. No ..... Turn to 18

20. Do you listen to the radio?

1: Yes, Since ....., How often do you listen to it?
i.Always
ii.Sometimes
iii.Rare

Did you hear of Our Good Nature Land Programme?
a: Yes .... Do you listen to it? -Yes .... How often?
i.Always
ii.Sometimes
iii.Rarely
-No ..... Turn to 21

b: No .... Turn to 21

How do you evaluate the Our Green Land from the point of providing you with new information and persuading you to adopt innovations?

a.Information: i: Good ii: Medium iii: Useless

iv: Do not know
b.Persuasion: i: Good ii: Medium iii: Useless
iv: Do not know
2. No ..... Turn to 21

21. Did you hear about Extension publications?

1: Yes, Since ....., Can you read them?
a: Yes .... How often do you read?
i.Always
ii.Sometimes
iii.Rarely
b: No ..... Turn to 22
How do you evaluate the Extension publication from the point of providing you with new information and persuading you to adopt innovations?

a.Information: i: Good ii: Medium iii: Useless
iv: Do not know
b.Persuasion: i: Good ii: Medium iii: Useless
iv: Do not know
2. No ..... Turn to 22

22. Do you exchange visit with your neighbours?

1: Yes, Since ....., How often do you exchange visit with your neighbour?
i.Always
ii.Sometimes
iii.Rarely
Do you discuss farming with them?
a: Yes ..... How often?
i.Always
ii.Sometimes
iii.Rare
b: No .....
How do you evaluate the your neighbours from the point of providing you with new information and persuading you to adopt innovations?

a.Information: i: Good ii: Medium iii: Useless
iv: Do not know
b.Persuasion: i: Good ii: Medium iii: Useless
iv: Do not know
2. No .....

23. Can you tell me your awareness, involvement, and judgement about the following agricultural activities?

		Ext. film show	Agri. Exhibition	Study tour	Field day	Training course
1.Awareness	Yes	....	.....	.....	.....	.....
	No	....	.....	.....	.....	.....
2.Since		....	.....	.....	.....	.....
3.Involvement	Yes	....	.....	.....	.....	.....
	No	....	.....	.....	.....	.....
4.Judgement						
Information						
Good		....	.....	.....	.....	.....
Medium		....	.....	.....	.....	.....
Useless		....	.....	.....	.....	.....
Do not know		....	.....	.....	.....	.....
Persuasion						
Good		....	.....	.....	.....	.....
Medium		....	.....	.....	.....	.....
Useless		....	.....	.....	.....	.....
Do not know		....	.....	.....	.....	.....

24. Now I would like you to choose and rank the methods that you prefer to provide you with up to date information and helping you to adopt innovations in the future?

The method	Rank	The method	Rank
1.Extension agent	....	8.Exhibition	....
2.Cooperative	....	9.Study tour	....
3.Extension plot	....	10.Field day	....
4.TV	....	11.Film show	....
5.Radio	....	12.Training	....
6.Publications	....	13.By yourself	....
7.Leadership	....	14.None	....

G.5 Farmers Practicing behaviour on rain-fed wheat

1. What type of crops do you usually grow and the main cash crop(s), from the point of your view and approximately the area devoted for wheat every year?

Type	Main cash crop	Area devoted for wheat
.....	.....	.....
.....	.....	.....

.....	.....	.....
.....	.....	.....

2. Can you state the constraints that you encounter in farming in general and in wheat production in particular?

Farming in general	Wheat in particular
.....	.....
.....	.....
.....	.....
.....	.....

3. Can you tell me about wheat labour division by sex? Man does .....
....

   Woman does ....
....

4. Do you use chemical fertilizers for your rain-fed wheat crops?

   a.Yes
   b.No ..... Do you use organic fertilizers
   i.Yes .....How much per Donnom .....
   ii.No ..... Turn to 9

5. When did you start using nitrogen (N) for the first time, how much nitrogen do apply, how long have you been using this amount, what type of nitrogen did you use, how many times did you apply this amount, how do you apply it, and in your opinion what is the best amount of nitrogen to be applied?

Date of first using N	Amount of N	Period of using this amount	Type of nitr-ogen	Time of applying nitrogen	Method of applying nitrogen	Best amount of nit-rogen
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

6. When did you start using Phosphate (P) for the first time, how much P did apply, how long have you been using this amount, what type of P do you use, how many time did you apply this amount, how do you apply it, and in your opinion what is the best amount of P to be applied?

Date of first using P	Amount of P	Period of using this amount	Type of P	Time of applying P	Method of applying P	Best amount of P
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

7. How much nitrogen do you usually apply per Donnom at planting time, when did you start using it for the first time? Who recommended you to do this?

Amount of nitrogen applied at planting	Date of first time of using nitrogen at planting	Source of recommendation
.....	.....	.....
.....	.....	.....

8. Can you explain the reasons for using chemical fertilizers and the degree to which they help you to reach this decision?

Reasons	Degree of importance				Rank
	Important	Medium	Poor	Not	
1.....	3	2	1	0	..
2.....	3	2	1	0	..
3.....	3	2	1	0	..
4.....	3	2	1	0	..
5.Aware of its application	3	2	1	0	..
6.Its availability on time	3	2	1	0	..
7.Credit availability	3	2	1	0	..
8.Availability of capital	3	2	1	0	..
9.Not risky	3	2	1	0	..
10.Want to increase the yield	3	2	1	0	..
11.Reduce the possibility of crop failure	3	2	1	0	..
12.Recommended by Extension	3	2	1	0	..
13.My neighbour is using it	3	2	1	0	..
14.Labour availability	3	2	1	0	..
15.Not expensive	3	2	1	0	..

From your experience in using chemical fertilizers what kind of difficulties do you encounter and your suggestions to eliminate them?

.....

.....

.....

9. Can you explain the reasons for not using chemical fertilizers and the degree to which they force you to reach this decision?

Reasons	Degree of importance				Rank
	Important	Medium	Poor	Not	
1.....	3	2	1	0	..
2.....	3	2	1	0	..
3.....	3	2	1	0	..
4.....	3	2	1	0	..
5.Not aware of its application	3	2	1	0	..
6.Fertilizer is not available on time	3	2	1	0	..
7.Credit is not available on time	3	2	1	0	..
8.Lack of capital	3	2	1	0	..
9.Risky to use	3	2	1	0	..
10.No real benefit of using it	3	2	1	0	..
11.lack of trust in Extension	3	2	1	0	..
12.Neighbour do not use it	3	2	1	0	..
13.Lack of labour	3	2	1	0	..
14.Expensiveness	3	2	1	0	..
15.Causes more weed problem	3	2	1	0	..

What do you think the best solution for solving your problem and if it is solved would you apply the chemical fertilizers?

.....

.....

10. Can you explain the reasons for:

a:Not applying nitrogen at all,
b:Applying low amount of nitrogen,
c:Applying medium amount of nitrogen,
d:Applying the recommended amount of nitrogen

The degree of their importance in helping or forcing you to take this decision?

Reasons	Degree of importance				Rank
	Important	Medium	Poor	Not	
1.....	3	2	1	0	....
2.....	3	2	1	0	....
3.....	3	2	1	0	....
4.....	3	2	1	0	....
5.....	3	2	1	0	....

11. Can you explain the reasons for:

a:Not applying nitrogen at planting time,
b:Applying low amount of it,
c:Applying medium amount of it,
d:Applying the recommended amount of it,
The degree of their importance in helping or forcing you to take this decision?

Reasons	Degree of importance				Rank
	Important	Medium	Poor	Not	
1.....	3	2	1	0	...
2.....	3	2	1	0	...
3.....	3	2	1	0	...
4.....	3	2	1	0	...
5.....	3	2	1	0	...

12. Can you explain the reasons for:

a:Not applying nitrogen phosphate at all,
b:Applying low amount of phosphate,
c:Applying medium amount of phosphate,
d:Applying the recommended amount of phosphate,
and the degree of their importance in helping or forcing you to take this decision?

Reasons	Degree of importance				Rank
	Important	Medium	Poor	Not	
1.....	3	2	1	0	....
2.....	3	2	1	0	....
3.....	3	2	1	0	....
4.....	3	2	1	0	....
5.....	3	2	1	0	....

13. What are the main problems you face at the time of obtaining chemical fertilizers?

1..... 6.....
2..... 7.....
3..... 8.....
4..... 9.....
5..... 10.....

14. Can you tell about the wheat varieties you did use in the past and in this year, the source of wheat seeds, the sources of new information about new seeds, seed renewal, the area devoted for each variety, the first year of use of each, and the continuity in planting of each variety?

Wheat variety	Source of seed	Source of information	Area	Seed renewal yes	no	Date of first use	Continuity Yes	No
.....	.....	.....	.....	...	.....	.....	...	...
.....	.....	.....	.....	...	.....	.....	...	...
.....	.....	.....	.....	...	.....	.....	...	...
.....	.....	.....	.....	...	.....	.....	...	...
.....	.....	.....	.....	...	.....	.....	...	...

15. Can you explain the reasons for using improved wheat varieties and the degree to which they help you to reach this decision?

Reasons	Degree of importance Important	Medium	Poor	Not	Rank
1.....	3	2	1	0	..
2.....	3	2	1	0	..
3.....	3	2	1	0	..
4.....	3	2	1	0	..
5.Aware of its application	3	2	1	0	..
6.Its availability on time	3	2	1	0	..
7.Credit availability	3	2	1	0	..
8.Availability of capital with you	3	2	1	0	..
9.Not risky	3	2	1	0	..
10.Increase the yield	3	2	1	0	..
11.Good quality of straw and seed	3	2	1	0	..
12.Recommended by Extension	3	2	1	0	..
13.My neighbour was using it	3	2	1	0	..
14.Resistance to pesticide/ fungicide	3	2	1	0	..

15.Not expensive	3	2	1	0	..

If the farmers have used more than one improved variety then his reasons for others could be extended on the back of this sheet. Also farmers who are using only traditional varieties of wheat would be asked about their reasons for using them in particular as well as for reasons for not using the improved varieties in general.

From your experience in using improved varieties what kind of difficulties do encounter and your suggestions to eliminate them?

.....

.....

16. Can you explain the reasons for

a:Not using improved varieties at all,
b:Using traditional varieties more,
c:Using traditional and improved varieties equally,

The degree to which they force you to reach this decision?

Reasons	Degree of importance				Rank
	Important	Medium	Poor	Not	
1.....	3	2	1	0	...
2.....	3	2	1	0	...
3.....	3	2	1	0	...
4.....	3	2	1	0	...
5.Not aware of it or its application	3	2	1	0	...
6.Seeds is not available on time	3	2	1	0	...
7.Credit is not available on time	3	2	1	0	...
8.Lack of capital	3	2	1	0	...
9.Risky to use	3	2	1	0	...
10.No real benefit of using it	3	2	1	0	...
11.lack of trust in Extension	3	2	1	0	...
12.Neighbour do not use it	3	2	1	0	...
13.Not resistant to fungicides/pesticides	3	2	1	0	...
14.Expensiveness	3	2	1	0	...
15.Bad quality of seed	3	2	1	0	...
16.Not resistant to shattering	3	2	1	0	...

17.Not resistant to drought	3	2	1	0	...
18.Not resistant to lodging	3	2	1	0	...

What do you think the best solution for solving your problem and if it is solved would you apply improved varieties?

....
....

17. How do you usually broadcast your wheat seeds?

a.By hand..... How many K.g. do broadcast per Donnom?.
b.By machine..... How many K.g. do broadcast per Donnom?..
How often do you use it?
-Always
-Sometimes
-Rarely
When did you start using it for the first time?.....
From where did you learn about its advantages.....
.....

18. Can you explain the reasons for using sowing machine every year and the degree to which they help you to reach this decision?

Reasons	Degree of importance Important	Medium	Poor	Not	Rank
1.....	3	2	1	0	...
2.....	3	2	1	0	...
3.....	3	2	1	0	...
4.....	3	2	1	0	...
5.Aware of its importance	3	2	1	0	...
6.Its availability on time	3	2	1	0	...
7.Credit availability	3	2	1	0	...
8.Availability of capital with you	3	2	1	0	...
9.Not risky	3	2	1	0	...
10.Save time and effort	3	2	1	0	...
11.Lowering the possibility of crop failure	3	2	1	0	...
12.Recommended by Extension	3	2	1	0	...
13.My neighbour was using it	3	2	1	0	...
14.Labour not available	3	2	1	0	...
15.Not expensive	3	2	1	0	...
16.More accurate	3	2	1	0	...

17.Save seeds	3	2	1	0	...

From your experience in using sowing machine what kind of difficulties do encounter and your suggestions to eliminate them?

....
....

19. Can you explain the reasons for

a:Broadcasting seed by hand,
b:Rarely use to the sowing machine,
c:Sometimes use to the sowing machine,

The degree to which they force you to reach this decision?

Reasons	Degree of importance				Rank
	Important	Medium	Poor	Not	
1.....	3	2	1	0	...
2.....	3	2	1	0	...
3.....	3	2	1	0	...
4.....	3	2	1	0	...
5.Not important	3	2	1	0	...
6.Its is not available on time	3	2	1	0	...
7.Credit is not available on time	3	2	1	0	...
8.Lack of capital	3	2	1	0	...
9.Risky to use	3	2	1	0	...
10.Waste seeds	3	2	1	0	...
11.lack of trust in Extension	3	2	1	0	...
12.Neighbour do not use it	3	2	1	0	...
13.Not accurate	3	2	1	0	...
14.Expensiveness	3	2	1	0	...
15.Availability of cheap labour	3	2	1	0	...

What do you think the best solution for solving your problem and if it is solved would you use sowing machine?

.....
.....

20. How do you usually control your wheat weed?

a.Do not control .....

b.By hand .....
c.By herbicides .....
How often do you use them?
-Always
-Sometimes
-Rarely
When did you start using herbicide for the first time?..
From where did you learn about its advantages.....
.....

21. Can you explain the reasons for using herbicides every year and the degree to which they help you to reach this decision?

Reasons	Degree of importance				Rank
	Important	Medium	Poor	Not	
1.....	3	2	1	0	...
2.....	3	2	1	0	...
3.....	3	2	1	0	...
4.....	3	2	1	0	...
5.Aware of its application	3	2	1	0	...
6.Its availability on time	3	2	1	0	...
7.Credit availability	3	2	1	0	...
8.Availability of capital with you	3	2	1	0	...
9.Not risky	3	2	1	0	...
10.Save time and effort	3	2	1	0	...
11.Lowering the possibility of crop failure	3	2	1	0	...
12.Recommended by Extension	3	2	1	0	...
13.My neighbour was using it	3	2	1	0	...
14.Labour not available	3	2	1	0	...
15.Not expensive	3	2	1	0	...
16.Spray equipment are available	3	2	1	0	...
17.Easy to use	3	2	1	0	...
18.More accurate in killing weeds	3	2	1	0	...
17.Much cheaper than hiring labour	3	2	1	0	...

From your experience in using herbicides what kind of difficulties do encounter and your suggestions to eliminate them? ....
....

22. Can you explain the reasons for

a:Not using herbicides,
b:Rarely using herbicides,
c:Sometimes using herbicides,

The degree to which they force you to reach this decision?

Reasons	Degree of importance				Rank
	Important	Medium	Poor	Not	
1.....	3	2	1	0	...
2.....	3	2	1	0	...
3.....	3	2	1	0	...
4.....	3	2	1	0	...
5.Not aware of its use	3	2	1	0	...
6.It is not available on time	3	2	1	0	...
7.Credit is not available on time	3	2	1	0	...
8.Lack of capital	3	2	1	0	...
9.Risky to use	3	2	1	0	...
10.No real benefit of using herbicides	3	2	1	0	...
11.lack of trust in Extension	3	2	1	0	...
12.Neighbour do not use it	3	2	1	0	...
13.Not accurate	3	2	1	0	...
14.Expensiveness	3	2	1	0	...
15.Availability of cheap labour	3	2	1	0	...
16.Spray equipment were not available	3	2	1	0	...
17.Difficult to use	3	2	1	0	...
18.Dangerous for health	3	2	1	0	...
19.No real weed problem	3	2	1	0	...

What do you think the best solution for solving your problem and if it is solved would you use herbicides? ....

23. How do you usually control your pests?

a.Do not control .....
b.By hand .....
c.By pesticides .....
How often do you use them?
-Always
-Sometimes
-Rarely

When did you start using pesticide for the first time?..

From where did you learn about its advantages.....
.....

24. Can you explain the reasons for using pesticides every year and the degree to which they help you to reach this decision?

Reasons	Degree of importance				Rank
	Important	Medium	Poor	Not	
1.....	3	2	1	0	...
2.....	3	2	1	0	...
3.....	3	2	1	0	...
4.....	3	2	1	0	...
5.Aware of its application	3	2	1	0	...
6.Its availability on time	3	2	1	0	...
7.Credit availability	3	2	1	0	...
8.Availability of capital	3	2	1	0	...
9.Not risky	3	2	1	0	...
10.Lowering the possibility of crop failure	3	2	1	0	...
11.Recommended by Extension	3	2	1	0	...
12.My neighbour was using it	3	2	1	0	...
13.Not expensive	3	2	1	0	...
14.Spray equipment are available	3	2	1	0	...
15.Easy to use	3	2	1	0	...

From your experience in using pesticides what kind of difficulties do encounter and your suggestions to eliminate them?

....
....

25. Can you explain the reasons for

a:Not using pesticides,
b:Rare use to the pesticides,
c:Sometimes use to the pesticides,

The degree to which they force you to reach this decision?

Reasons	Degree of importance				Rank
	Important	Medium	Poor	Not	
1.....	3	2	1	0	...

2.....	3	2	1	0	...
3.....	3	2	1	0	...
4.....	3	2	1	0	...
5.Not aware of its use	3	2	1	0	...
6.It is not available on time	3	2	1	0	...
7.Credit is not available on time	3	2	1	0	...
8.Lack of capital	3	2	1	0	...
9.Risky to use	3	2	1	0	...
10.No real benefit of using herbicides	3	2	1	0	...
11.lack of trust in Extension	3	2	1	0	...
12.Neighbour do not use it	3	2	1	0	...
13.Not accurate	3	2	1	0	...
14.Expensiveness	3	2	1	0	...
15.Spray equipment were not available	3	2	1	0	...
17.Difficult to use	3	2	1	0	...
18.Dangerous for health	3	2	1	0	...
19.No real weed problem	3	2	1	0	...

What do you think the best solution for solving your problem and if it is solved would you use herbicides?

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26. How do you harvest your wheat? a: By hand b: With machine

27. How do you thresh your wheat? a: By animal b: By machine

28. Can you tell me how do you prepare your land for planting, when did start using this method of seed bed preparation, and who advised you to use this method? ....